~~SECRET~~
~~CONFIDENTIAL~~
HW--74101

DE93 003573

DECLASSIFIED

IRRADIATION PROCESSING DEPARTMENT

MONTHLY REPORT

JUNE 1962

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

HANFORD ATOMIC PRODUCTS OPERATION

GENERAL ELECTRIC

RICHLAND, WASHINGTON

DECLASSIFIED

APR 12 1992

~~SECRET~~
~~CONFIDENTIAL~~

~~CONFIDENTIAL~~
DISTRIBUTION RESTRICTED TO U.S. ONLY *1/2*

DECLASSIFIED

This document consists of
65 pages, No. 5 of
80 copies. Series 4.

IRRADIATION PROCESSING DEPARTMENT
MONTHLY REPORT
JUNE, 1962

HANFORD
82376

CLASSIFICATION CANCELLED AND CHANGED TO
DECLASSIFIED

Compiled By
IPD Personnel

BY AUTHORITY OF CG-PB2

Robert A. Stearns 8-3-72

BY J. W. Welch 8-15-72

VERIFIED BY PM Enck 8-25-92

July 13, 1962

RICHLAND, WASHINGTON

Work performed under Contract No. AT(45-1)-1350 between the
Atomic Energy Commission and the General Electric Company.

~~RESTRICTED DATA~~

~~This document contains Restricted Data as defined in the Atomic
Energy Act of 1954. Its transmittal or the disclosure of its
contents in any manner to an unauthorized person is prohibited.~~

DECLASSIFIED

Route To:	P.R. No.	Location	Files Route Date	Signature and Date
<u>Richland</u>	<u>1100</u>	<u>IRRADIATION PROCESSING DEPT</u>		
		<u>HANFORD</u>		
		<u>CG-PB2</u>		

72-508-1423
DATE OF REVIEW OF CLASSIFICATION

DISTRIBUTION

Copy Number

1	W. E. Johnson
2	A. B. Greninger
3	H. M. Parker
4	APD, F. E. Crever
5-6-7-8	AEC-HOO, J. E. Travis
9-10	AEC Production Division, F. P. Baranowski
11	AEC-SROO, R. C. Blair
12	R. L. Dickeman
13	O. H. Greager
14	R. T. Jessen
15	O. C. Schroeder
16	W. A. Shanks
17	J. S. McMahon
18	S. H. Small
19	300 Area File
20	Records Center

RECEIVED

TABLE OF CONTENTS

<u>SUMMARY</u>	A-1
<u>GENERAL</u>	A-4
<u>MANUFACTURING</u>	
Production Operation	B-1
Reactor Operation Statistics	B-2
Reactor Operations	B-3
Applied Reactor Engineering Operation	B-6
<u>RESEARCH AND ENGINEERING</u>	
Process and Reactor Development Operation	C-1
Process Technology Operation	C-10
Operational Physics Operation	C-16
Testing Operation	C-20
<u>FACILITIES ENGINEERING</u>	
Reactor Modification Design Operation	D-1
Equipment Development Operation	D-3
Plant Engineering Operation	D-4
Project Engineering Operation	D-6
<u>NPR PROJECT</u>	
Process Design Operation	E-1
Field Engineering Operations	E-4
Program Evaluation	E-7
<u>SIGNIFICANT REPORTS ISSUED</u>	F-1
<u>TRIPS</u>	F-4
<u>VISITORS</u>	F-9

SUMMARYMANUFACTURING

Reactor input production (MWD) was 8.5 per cent above forecast; 12.8 per cent below at the six old reactors and 39.9 per cent above at the K's. Production for the second quarter was 4.3 per cent above forecast.

Over-all time operated efficiency was 68.6 per cent (71.1 per cent forecast); 62.2 per cent at the six old reactors and 87.7 per cent at the K's. Efficiency was below forecast at the six old reactors and above at the K's due largely to deferring a six-day dual reactor outage at the K's for the tie-in of the Emergency Backup Coolant System. This provided an additional week which was utilized for tube replacement at one of the old reactors.

There was no increase in reactor power levels.

Four ruptures, all I&E natural metal, were removed from the reactors. Two were at D, one at DR and one at F. The three D and DR ruptures were dingot metal.

On the tube replacement program, 614 new process tubes were installed for a total of 3863 to date this year.

RESEARCH AND ENGINEERING

Power levels for all reactors are now restricted by bulk outlet water temperature limits. However, the tube corrosion aspect provides continued incentive for the high flattening efficiency which is being maintained.

Because of the effects of eccentric placement of fuel elements in a process tube and the dependency of self-supported fuel on the design of the supporting members for control of eccentricity, a study of the heat transfer factors for the K Reactor self-supported fuel was made and the indicated limits for design of the supports were determined.

An over-all review of the Ball 3X system philosophy and criteria for present Hanford production reactors has been initiated. It is estimated that two months will be required for its completion.

The reactivity and control effects of vertical-channel lining sleeves were calculated and documented in HW-74046, "Effects on C and K Control Capacity of VSR Liners".

The alum feed rate at all but the K Reactors continued at a nominal 18 ppm. At KE, it was increased from 13 to 18 ppm because of the unsatisfactory P32 reduction at the lower rate and was increased from 18 to 20 ppm at KW as the first step in a test of the usefulness of still higher alum feeds. Experience to date at the 20 ppm rate has shown no significant reduction as compared with that at 18 ppm.

DECLASSIFIED

A document describing the effects of Cl¹⁴ in reactor effluents is being prepared in cooperation with Hanford Laboratories. Results of the study indicate that dose to workers in the reactor areas and to the surrounding populace due to Hanford Cl¹⁴ contribution is insignificant compared to natural background.

Experience has demonstrated that the July 1961 normalization of the IPD production accounting program was successful; only minor modifications will be recommended for the July 1962 normalization.

The purity test program for the NPR graphite stack has been completed with the publication of HW-72654, Part 3, "NPR Stack Purity Results - Description, Analysis and Results". Preceding parts of this series are 1, "Experimental Variations of Absolute Count Rate Method", and 2, "Test Authorization".

FACILITIES ENGINEERING

An order for 5,200 zirconium tubes for the 105-K Reactors was placed with the low bidder at a price of \$537 per tube. Design and testing of modifications in support of this program have continued.

Drop testing of a 105-C Reactor size flexible vertical safety rod in a channel lined with polycrystalline graphite sleeves continued. Tests indicate that the liner sections will not be satisfactory for a 2-1/2 inch horizontal channel displacement in a six foot arc. Rod drop tests in a channel section filled with 3X balls resulted in failure of the liner section at the ball level due to rod impact.

An evaluation has been completed of the modifications required for installation of a B size flexible vertical safety rod in 105-DR and K Reactors. The use of the smaller B size rod is being undertaken in order to improve the speed of VSR insertion time in several of the channels which are currently indicating evidence of binding.

Three hundred and ninety-nine tube channels at the 105-C Reactor and 275 tube channels at the 105-DR Reactor were drilled with the new drill drive unit. Of these, two new tubes at C Reactor and approximately 30 new tubes at DR Reactor were lost on insertion.

The peak Columbia River flow has been about 320,000 cfs, which is about 70,000 cfs below normal for this time of year. Storage of water in Grand Coulee Reservoir was started on June 17. River temperature at Priest Rapids is about 13-1/2 C, which is 2 C below normal for this time of year.

Two of the new primary loop pumps for Project CGI-839 (Modification of Fuel Element Test Facilities - 1706-KER) have failed. One is being repaired on plant. The other must be returned to the seller.

The dual shutdown of both K Area Reactors to perform final tie-in of equipment and testing on Project CGI-844 (100-K Area Coolant Backup) is now scheduled to start July 16.

NPR PROJECT

A comprehensive fatigue analysis of the NPR inlet and outlet primary piping has been completed.

The primary coolant pump which failed during a preliminary hot test on April 17, was reassembled with modifications and a preliminary hot test was run on June 5. The loop temperature was increased from ambient to about 600 F at an average rate of about 120 F per hour while the speed was increased from 500 rpm to 1800 rpm. After about 45 minutes operation at 600 F the temperature was reduced to 200 F at a rate of about 120 F per hour. There were no indications of any troubles with the pump operation.

Intensive efforts have been initiated at Chandler-Evans to resolve the problem with variable piston ring leakage which results in erratic actuation of process diversion valves.

Assembling and testing of horizontal rod hydraulic cylinders by the subvendor, Cascade, has been resumed. Changes to the cylinder packing design, the packing tightening procedure, and the cylinder rod straightness inspection procedure were requested and have been approved.

Revised Approved-for-Construction drawings showing the deletion of the matrix-type mixing header were received from Burns and Roe on June 19, were reviewed and accepted by General Electric on the same date.

A letter was transmitted to Burns and Roe on June 8, that defines the analog simulation program required by General Electric to show acceptability of the heat dissipation system.

No bids were submitted by the ten vendors solicited to furnish the 420-cycle power supply for the flow monitor system. Visits were subsequently made to several vendors to stimulate interest. These visits resulted in seven firms expressing interest in bidding.

General Electric representatives met with the Atomic Energy Commission and Burns and Roe in Hempstead, New York June 26 and 27 to integrate remaining design and procurement items. Progress was made and benefits are expected.

Picket lines were established by the construction carpenters on May 16, and by the construction teamsters on May 28. Pickets were withdrawn at 2:30 p.m., June 12, and approximately 85 per cent of the Kaiser Engineers' craft personnel returned to work on June 13.

Process tube installation has been limited to a single shift in order to allow the Tube Shop time to reprocess scratched tubes. At the end of June, 904 process tubes had been installed.

Eddy current testing of the Inconel tubing installation through the inner rod room wall penetrations has been completed. As a result, four of the 1162 tubes will be permanently abandoned. In addition, 12 tubes will be used as spare tubes only. Work was started during the week of June 18, on performing Eddy current tests of Inconel tubing that is stored in the warehouse.

DECLASSIFIED

Activity in the HULCO shop has continued to improve during the past month. Primary pipe activity in the field started again on a limited basis on June 13.

GENERAL

RESPONSIBILITY

There was no significant change in responsibility.

FORCE SUMMARY

	<u>Exempt</u>	<u>Non-Exempt</u>	<u>Total</u>
General	7	2	9
Research and Engineering	105	62	167
Manufacturing	416	1427	1843
Facilities Engineering	97	38	135
NPR Project	90	24	114
Financial	18	12	30
TOTAL	733	1565	2298

SAFETY, SECURITY AND RADIATION EXPERIENCE

There were 88 medical treatment injuries, three security violations and no disabling injuries. A craftsman received radiation exposure in excess of operational control for the badge period and an exempt roll employee received radiation exposure in excess of operational control for the calendar year. Both exposures occurred during graphite stringer removal work.

INVENTIONS

All persons engaged in work that might reasonably be expected to result in inventions or discoveries advise that, to the best of their knowledge and belief, no inventions or discoveries were made in the course of their work during the period covered by this report except as listed below. Such persons further advise that, for the period therein covered by this report, notebook records, if any, kept in the course of their work have been examined for possible inventions or discoveries.

<u>Name</u>	<u>Date</u>	<u>Title</u>
G. E. Wade	6-5-62	Combination Shutdown and Control for Nuclear Reactors
C. E. Frantz	6-14-62	Device for Overboring through Graphite Stack
H. J. Greer	6-6-62	Internal Pipe Surveying Apparatus

AB Greninger:DLD:kn

AB Greninger
General Manager

MANUFACTURING

PRODUCTION OPERATION

There were no discharge goal exposure adjustments initiated during June. Average discharge exposures rose as anticipated reflecting a reduction in the amount of material designated rupture prone.

Discharge Exposure Comparison (MWD/T)

	<u>Natural Uranium</u>		<u>Enriched Uranium</u>	
	<u>6 Old</u>	<u>2 K's</u>	<u>6 Old</u>	<u>2 K's</u>
April	573	635	879	738
May	572	669	918	735
June	619	675	822	868

Rail and truck shipments of Essential Materials were as follows:

Carload shipments for IPD	-	216
Carload shipments for other Depts.	-	212
Truck shipments for IPD	-	<u>217</u>
Total		645

DECLASSIFIED

MONTH		REACTOR OPERATION STATISTICS - PROCESSING										
		B	C	D	DR	F	H	KE	KW	TOTAL		
June, 1962												
INPUT PU (% OF FORECAST)		103.7	67.3	107.5	72.1	88.5	77.3	142.9	137.1	108.5		
TIME OPER. EFF. (% OVERALL)		80.1	44.6	82.3	38.3	68.1	59.6	86.8	88.6	68.6		
NEW TUBES INSTALLED		0	191	5	295	7	147	0	0	645		
WATER LEAKS - TUBE		0	8	2	0	3	2	0	0	15		
- VAN STONE		0	4	0	1	0	5	0	0	10		
FUEL ELEMENT RUPTURE		0	0	2	1	1	0	0	0	4		
HELIUM CONSUMED - M CU. FT.		1067.4	637.9	692.4	330.6	533.7	315.2	177.1	248.6	4002.9		
UTILIZATION OF REACTOR OUTAGE HOURS												
										TOTAL HOURS	% OF TIME	
CHARGE - DISCHARGE		31.1	27.0	40.8	53.3	45.3	40.6	52.7	48.5	339.3	5.9	
RUPTURE REMOVAL				46.6	2.1	49.9				98.6	1.7	
WATER LEAK		21.3	113.9	3.4	17.7	47.2	76.5			280.0	4.9	
TUBE REPLACEMENT		8.7	203.6	9.0	273.7	23.7	148.2	5.6	4.8	677.3	11.7	
MAINTENANCE		55.3	31.7	22.6	21.0	60.1	20.5	10.9	22.8	244.9	4.2	
STANDARD CHECK		8.1	2.0		7.0			0.6		17.7	0.3	
PRODUCTION TEST		18.2	19.8	4.4	60.8	3.7		25.0	0.9	132.8	2.3	
PROJECT WORK									5.3	5.3	0.1	
OTHER		0.6	1.0	0.5	8.4		4.8			15.3	0.3	
TOTAL		143.3	399.0	127.3	444.0	229.9	290.6	94.8	82.3	1811.2	31.4	
REACTOR OPERATION STATISTICS - POWER												
RIVER WATER PUMPED - M GALS.		6659.1		5441.1		3615.8	3130.9	8548.4	8270.2	35665.5		
WATER TREATED - M GALS.		2941.5	3023.2	3852.4	1442.4	3572.6	3026.6	8526.2	8270.2	34655.1		
WATER TO REACTOR - GPM NOR.		89000	100500	87000	87000	88200	84500	195000	188500	919700		
FINISHED WATER												
TURBIDITY PPM AVG.		.005	.007	.005	.005	.004	.003	.003	.003			
PH AVG.		7.00	7.00	7.00	6.97	6.90	6.95	6.60	6.60			
CL ₂ RESIDUAL PPM AVG.		.05	.05	0	0	.05	.12	.20	.24			
DICHROMATE PPM AVG.		1.00	1.40	0.96	0.96	0.96	0.81	1.76	1.84			
STEAM GENERATED M LBS.		56301		65939		29465	37264	23631	24380			
EVAPORATION RATE/LBS. OF COAL		8.34		8.45		9.16	9.16					
EVAPORATION RATE/GAL. OF OIL								114.3	110.5			
TOTAL KW - HR GENERATED								1572400	1573600	3146000		

B-C REACTOR OPERATION

In addition to a scheduled charge-discharge outage at B Reactor, one trip caused by an oscillating Panellit gauge and one Panellit scram due to the failure of an experimental spline seal occurred.

C Reactor experienced five outages. One was for tube replacement, and two to repair water leaks. The other two outages were to repair a faulty thermocouple and to investigate abnormal moisture in the discharge area atmosphere.

Operational status of all graphite stringers and ground detection instrumentation in the Panellit board was achieved at B Reactor.

At C Reactor, 191 uniform wall aluminum process tubes were installed, revisions to the far sample room gamma monitor were completed, 110 rear face thermocouples were repaired, four Van Stone and eight internal tube leaks were corrected, 79 process tubes were measured using the Probolog, and five thermocouple trains were installed downstream of new fuel element charges.

Inspection of No. 10-B pump at 181-B after it failed during start-up revealed misalignment causing two broken couplings. The couplings were replaced and the pump returned to normal service.

A gain of 700 gpm in total B Reactor process water flow was realized by the installation of a 14-inch bypass line around the No. 2 tank at 190-B and the replacement of thirty-five front-face orifices with 0.310-inch venturis.

Following work on the subcritical monitor at C Reactor contamination of 80,000 c/m was found on an employee's right knee. Successful decontamination was accomplished.

Nasal contamination of 40,000 c/m was received by three employees during VSR channel work. The employees were effectively decontaminated and processed through the whole body counter for internal isotopic deposition measurement.

D-DR REACTOR OPERATION

D Reactor was shut down four times during June. The causes were rupture of fuel elements (two outages), a process tube water leak, and faulty Panellit circuitry on a poison column control facility tube. DR Reactor was also shut down four times, once for a scheduled extended tube replacement outage and three times for unscheduled outages the causes of which were rupture of a fuel element, unexplained Panellit scram, and correction of two front nozzles which were found during routine inspection to have missing cap lugs.

The installation of Inconel rear face pigtails is 48 and 52 per cent complete at D and DR Reactors, respectively. Bumper nozzles have been installed on 84 per cent of the DR Reactor process tubes. A total of 295 process tubes was replaced at DR Reactor during the tube replacement outage.

The stator in No. 4 process pump motor at Building 190-DR was replaced with a stator reconditioned and upgraded by the vendor. This completed

reworking of the 16 Building 190-D and 190-DR stators which were installed on Project CG-558. The first stage impeller of No. 7 process pump at Building 190-DR, previously found to have been cracked, was replaced.

At DR Reactor, the initial bumpered natural fuel elements were charged. Use of reclaimed poison splines was started at D and DR Reactors with the successful insertion of a total of 41 splines. A new ball and trap device was successfully used to flush discharge 338 tubes at DR Reactor. This device was developed to give a more positive means of indicating that all metal has been removed from a discharged tube. A separate safety circuit battery system (Design Change 548) was installed at DR Reactor which provides an independent ground detection system on the safety circuit to eliminate the possibility of a non-critical circuit ground causing a reactor shutdown.

On June 14, a ruptured fuel element at D Reactor resulted in off-scale radio-activity readings from a rear riser. The Columbia River Emergency Plan was initiated but no downstream river contamination attributable to the rupture was found.

F REACTOR OPERATION

The reactor was down at the start of the month for scheduled charge-discharge. After start-up, a short outage was necessary to correct a leaking front face water connector. The reactor was also shut down on two other occasions due to a broken thermocouple well and a ruptured fuel element.

Worn parts in the check valves, located in the water lines to the No. 2 and No. 4 emergency pumps in the 190 Building, were replaced to stop excessive reverse flow; parts for the other 10 check valves have been ordered.

The rear face thermocouple replacement program has been delayed due to the discovery of two broken thermocouple wells in each of the last two vertical bundles installed. This program remains 41 per cent complete. Thirty-five rear face thermocouples were repaired and nine Panellit gauges were replaced due to sticking dials or leaks.

Electrical activities included the installation of temporary television to observe the operation of the horizontal control rods; a slight deflection was revealed in one of the half rods which will require a replacement. The No. 1 backwash motor was removed for offsite rewinding.

Mechanical activities included completion of the replacement program on the regular rear face Inconel water connectors and 80 per cent completion of the zone temperature Inconel water connectors.

Twelve tubes were removed, seven were replaced and five tube channels were blanked off. Special front and rear gunbarrels were installed in channel 0789 for gas pressure test purposes. Four rear face bellows were sealed with foam to prevent gas leaks. Five gasket and three tube leaks were found through stringer testing.

Design Change 429-F ~ VSR-HCR Interlock, 105-F, which provides an interlock to automatically prevent withdrawal of the horizontal control rods before withdrawal of the vertical safety rods was completed.

Contamination levels up to 500 rad/hour were encountered in the removal of the ruptured fuel element from tube 2272. Procedural controls and decontamination efforts were effective in preventing significant spread of contamination or exposure of personnel.

H REACTOR OPERATION

Reactor outages for the month included two Panellit scrams, two water leak outages, one start-up Beckman scram and an extended outage for tube replacement. The reactor remained down at month's end to clear a process tube channel of a broken splitter blade.

A total of 147 new tubes was installed during the month. A 66 per cent reduction of radiation levels was achieved by the decontamination effort resulting in average rear face radiation levels of 31 mr/hr.

Eighty-seven temperature monitor thermocouples were repaired. Included was the replacement of 14 thermocouple wells and three lead wires to the terminal block on the unit top. Installation of front adjustment Panellit gauges was completed under Maintenance Job Authorization 29. The replacement program of nozzle lug rings on all nozzles having conventional front caps was completed. The bellows of five rear face gunbarrels and nine rear thermal loop tubes were sealed with unicellular silicone foam to decrease helium gas losses. Initial results of the effort were favorable.

A new first-stage impeller was installed in the Number 4 process pump at 190-H due to cracks in the vanes of the old impeller. Initial boiler acceleration tests were carried out to accumulate response data under an authorization to reduce the minimum steam generation rate below 27,000 pounds per hour.

KE-KW REACTOR OPERATION

Each reactor was shut down on schedule once during the month for metal processing. In addition, following completion of the scheduled outage work, KE Reactor experienced five short duration outages. The causes were Panellit scrams (three outages), a rear face cap leak and a start-up scram while making flux monitor scale changes.

Ten hours of additional outage time were required during the scheduled outage at KW Reactor to replace the No. 6 low lift pump motor at 190-KW which failed during a test. The failure was caused by rubbing of the rotor and stator. The motor was returned to the Westinghouse shop at Portland, Oregon, for repair.

Fine gravel, two inches deep, was placed in the west half of No. 14 filter at 183-KE. This work is the initial phase of a planned program to reduce sand loss from all 183 filters due to increased water velocity through the filters.

Design Change No. 529, "Emergency Withdrawal of HCR's", and Design Change No. 537, "VSR-HCR Interlock", were installed at KE Reactor, thereby completing the planned K Reactor revisions. The modifications are designed to improve reactor safety.

A craftsman received radiation exposures in excess of the one rem per badge period administrative control limit. The incident was investigated and reported in HW-74179. An exempt roll employee received radiation exposures exceeding the HAP0 3 r operational control limit. The overexposure was investigated and reported in HW-74180. Both incidents occurred during graphite stringer removal work.

APPLIED REACTOR ENGINEERING

MAINTENANCE PRACTICES OPERATION

The fabrication and delivery of old reactor process tubes is on schedule and current tube replacement commitments can be met. The K aluminum process tubes bid requests are being held awaiting resolution of K zirconium tube quantity, delivery schedule, and outage schedules.

PLANT EQUIPMENT ENGINEERING OPERATION

A report (HW-73643) has been issued to record the results of an investigation to determine the cause of gunbarrel flange retaining ring failures. The report includes analysis and test results of retaining ring material, design configuration, service loading, and maintenance procedures and inspections. Recommendations to govern interim use of the existing configuration are included to serve until permanent corrective action is taken in conjunction with process tube replacement. Laboratory testing of replacement designs is still in progress.

A quarterly report was issued as HW-73858 to update performance record during the period March to June, 1962, on the mass replacement of process tubes in the six older reactors.

A document (HW-73953) was issued analyzing recent probolog data from the fringe tubes of the K Reactors and recommending a program for future probologging of these tubes.

SPECIAL OUTAGE SERVICES OPERATION

The splitter failure problem has been arrested. During the second half of the last H Reactor outage, a splitter blade using a different shape of zinc on the point contour was placed in use. The problem of breaking or sticking was reduced from a maximum of 18 per cent at DR during March to less than one per cent on the last 942 tubes at H, C and DR Reactors.

The boring of graphite in lieu of broaching has become standard procedure for H, DR and C Reactor. A total of 942 channels has now been bored without a major breakdown of equipment. The machine operates satisfactorily and will be adopted as a standard tool.

A mechanical pushing device for irradiated tube removal is now being used as standard equipment. With this equipment tubes are removed with less manpower, no damage to graphite is experienced, and the length of cut for removal is controlled.

During the last tube replacement outage the replacement rate at H Reactor was 0.94 hour/tube of Special Outages Services time for 249 tubes, 0.60 hour/tube for 398 tubes at C, and 0.77 hour/tube for 295 tubes at DR. A total of 614 tubes was replaced during June for a total of 3863 since January 1, 1962.

OC Schroeder

Manager, Manufacturing

OC Schroeder:DLD:bam

DECLASSIFIED

RESEARCH AND ENGINEERINGPROCESS AND REACTOR DEVELOPMENTREACTOR FUELSPresent Reactor TechnologyOverbore Fuel Development

No charge-discharge activity occurred during the report period. Irradiations were uneventful.

Self-Supported Fuel

Eighteen columns of CIVNS fuel elements were discharged from C Reactor during the 5-25-62 outage. No unusual discharge forces were required.

No charge-discharge of self-supported fuel from KW Reactor occurred during the report period.

Bumper Fuel

The irradiation phase of the elliptical bumper rail evaluation was completed on 5-27-62 with a discharge of the last eight columns (four pair) from D Reactor at an average tube exposure of 1060 MWD/T. The examination was scheduled for the week of 6-11-62. The data will be machine processed and analyzed.

Other Fuel Programs

Fourteen monitor columns charged into F Reactor to evaluate the oil-quench process reached scheduled goal exposure of 800 MWD/T on 6-25-62 and were discharged during that outage.

Ten monitor columns charged into B Reactor to evaluate alpha extrusion as an alternate fabrication process have accumulated an estimated tube exposure of 380 MWD/T. First scheduled discharge of four columns at about 400 MWD/T will occur at the next outage.

Eighteen columns consisting of Sylcor Hot Press, Hanford Hot Press and Hanford AlSi fuel elements were charged into C Reactor during the 5-25-62 outage. A total of 192 elements from each of the above processes are being irradiated to a goal of 800 MWD/T in Part I of this test.

Advanced Reactor TechnologyKER Testing

Loops one and two remain out of service for modification under project CGI-839.

CONFIDENTIAL

STATUS REPORT OF PRODUCTION TESTS

Test No.	Type Metal	Tubes 84	Reactor All	Goal		Remarks
				Exposure Normal	Current Exposure	
IP-216-A	Normal prod. natural and enriched fuel elements			Variable goal		Provides for monitoring the performance of a sample of all normal production material to assist in development of a Quality Index for production fuel. Test is continuous.
IP-272-A	I&E self- supported fuel	69	C	Variable +200		Provides for testing of CIVN geometry fuel in C Reactor ribless zirconium tubes.
IP-381-A & IP-431-A	I&E self- supported fuel overbore size	62	C	800 MMD/T		Provide preliminary qualitative data regarding irradiation behavior of larger fuel element designs.
IP-409-A	I&E self- supported fuel	2	KW	800 MMD/T		Provide qualitative data to confirm the fuel geometry design.
IP-423-A	Alternated oil- quenched and water- quenched natural uranium I&E fuel elements	14	F	800 MMD/T	780 MMD/T	Provide a comparison of dimensional stability of standard water-quenched uranium fuel cores and oil-quenched cores. First part of a three part test.
IP-432-A	Elliptical vs. regular bumpers	0	D	Variable		Provide a comparison of corrosion characteristics of "elliptical" bumper rails to current bumper rail design to determine their feasibility Test discharged on 5-27-62.
IP-468-A	Alpha extruded dingot	10	B	Variable	380 MMD/T	Elements charged 4-14-62 to evaluate alpha extruded uranium fuel cores as an alternate to rolled fuel cores.

HW-74101

Test No.	Type Metal	Tubes	Reactor	Goal Exposure	Current Exposure	Remarks
IP-477-A	Eleven 23-inch N Reactor fuel elements, KER-3	1	KE	1000 MWD/T	810 MWD/T	Elements charged 3-30-62, to evaluate N fuel behavior at N Reactor operating conditions. Discharged 6-18-62. Majority of irradiation experience at reduced temperatures.
IP-477-A	Eleven 23-inch N Reactor fuel elements, KER-3	1	KE		0	Elements charged 6-20-62, to evaluate N fuel at N Reactor operating conditions.
IP-477-A	Fourteen 23-inch N Reactor fuel elements, KER-4	1	KE	2000 MWD/T	440 MWD/T	Elements charged 4-26-62, to evaluate N fuel at N Reactor operating conditions.
IP-490-A	Diffusion bonded natural uranium I&E fuel elements	18	C	800 MWD/T	80 MWD/T	Elements charged 5-25-62, to provide a comparison of bond qualities of AlSi bonds and solid state diffusion bonds.

DECLASSIFIED

KER-3: Eleven 23-inch N Reactor fuel elements charged into KER loop 3 on 3-30-62 were discharged on 6-16-62 at an average exposure of 807 MWD/T. The majority of this exposure was accumulated at low temperature operation because of loop operating difficulties and it was necessary to install a new charge of fuel for high temperature service to acquire meaningful prototype data.

KER-4: The fourteen 23-inch N Reactor fuel elements scheduled for 2000 MWD/T goal exposure charged into KER-4 on 4-26-62, have accumulated an exposure of 443 MWD/T. Some loop operating difficulties have forced limited operation periods with cold water.

Fuel Designation Codes

OIIN	Old Reactors, second I&E model, natural uranium element.
OIINB	Old Reactors, third I&E model, natural uranium bumper rail element.
OIIIEB	Old Reactors, third I&E model, enriched uranium bumper element.
CIIN	C Reactor, second I&E model, natural uranium element.
CIVN	C Reactor, fourth I&E model, natural uranium element.
CIVNS	C Reactor, fourth I&E model, natural uranium self-support element.
CVIN	C Reactor, sixth I&E model, natural uranium element.
CVINB	C Reactor, sixth I&E model, natural uranium bumper element.
CVINS	C Reactor, sixth I&E model, natural uranium self-support element.
KVNS	K Reactor, fifth I&E model, natural uranium self-support element.
NIE1	N Reactor, inner tube, enriched uranium, first model.
NIN1	N Reactor, inner tube, natural uranium, first model.
NAE1	N Reactor, concentric tube assemblies, enriched uranium, first model.

REACTOR ENGINEERING

Present Reactor Technology

Reactor Graphite Stack Distortion

Production Test IP-512-A was written to approve six vertical and two horizontal special traverse measurements. To date, four vertical traverses have been made. Preliminary examination of the data qualitatively confirms that the Y-2 hole traverse data obtained previously does represent the most severe vertical distortion in the K Reactor stacks. The horizontal traverses will be run at an early date.

K Reactor Zircaloy-2 Tube Flow Tests

Flow tests in a header-to-header mockup of the K Zircaloy smooth-bore tube system confirm that the system will operate within established hydraulic criteria (same pressure-flow relations as for post-project CGI-883 conditions). An investigation of dummy element design and loading patterns for these tubes reveals that the use of a pattern containing self-supported elements in the nozzle provides about 1-1/2 gpm more flow than a pattern containing all non-

DECLASSIFIED

DECLASSIFIED

HW-74101

supported dummies. These tests further show that an additional 1 gpm may be obtained by the use of thinner-wall dummies with higher supporting members. Results of these studies will be documented when the measurements are complete.

Factors Influencing K Reactor Self-Supported Fuel Design

Eccentric placement of a fuel element in a process tube may result in boiling in the process tube, with ensuing effects on reactor operating continuity and an effect on the flow gage response to flow transients. With self-supported fuel columns, the amount of fuel element eccentricity is determined by the design of the supporting members. A study of the heat transfer factors to be considered in establishing criteria for support design indicates the following limits should be adhered to:

- a. The support height should be sufficient to prevent boiling at the end of the fuel charge. For the K Reactors, this limits the uranium column R to 1.2, or the maximum fuel element eccentricity is limited to 17 per cent. (For example, with a 0.1 inch average annulus, the restricted annulus may be no less than 0.083 inches.) The basis for this limit is that full coolant boiling in the process tube reduces the response of the Panellit gages to flow-loss transients.
- b. The design and placement of the supporting members should assure that the local annulus thickness, which may be reduced because of tube curvature or crushing of supports, is greater than 0.030 inch. The basis for this limit is that much accelerated fuel jacket corrosion occurs under conditions of reduced local annulus thickness.

A document describing these investigations is being prepared.

Advanced Reactor Technology

KER Tube Examination

The NPR process tube installed in KER Loop 3 was borescoped on 6-20-62. Minor scratches through the autoclave film were observed. No other marks, pits, or gouges were observed. The tube appeared to be in excellent shape, except for the fresh scratches which appeared to be caused by the discharge of the fuel elements.

Technical Manual - NPR

The comment issue of Vol. I, N Reactor Technical Manual was issued on 6-25-62. Sections on Reactor Fuels, Physics, and the Moderator will be inserted at a later date.

Technical Bases For Standards - NPR

The total number of rough draft Technical Bases for Standards now prepared is 66.

Hazards Review - NPR, Vol. II

Preparation of Volume II of the N Reactor Hazards Review continued during the month.

REACTOR PHYSICS

Present Reactor Technology

C Overbore - Conversion Ratio

Fuel discharged May 5 from the eight conversion ratio test columns is still cooling in the C basin.

E-N Load - Conversion Ratio

Several batches of blanket-supporting enriched uranium have been dissolved. Tritium extraction has been completed on material from the second E-N core loading and two large batches of blanket columns. Analytical results have not yet been received from these extractions.

Uranium Recycle

The per cent of recycled fuel in the enriched fuel present in the reactors at the end of May and discharged during May are given below.

Per Cent of Recycled Fuel in Enriched Fuel

	<u>B</u>	<u>C</u>	<u>D</u>	<u>DR</u>	<u>F</u>	<u>H</u>	<u>KE</u>	<u>KW</u>
May 31 status	87	~100	100	94	91	88	98	~100
May Discharge	93	99	100	85	85	90	100	100

Nuclear Safety

Spline Tester - The instrumentation requirements for the proposed Spline Testing Facility on C Reactor are presently being studied to prepare a cost estimate. A report and cost estimate should be completed in July.

Spline Burnout Test - Two of the spline samples being irradiated in KE have reached the desired exposure and have been removed from the reactor. The irradiations of the other two samples is expected to be completed in about two months.

Mint Testing Standards

The wafers for the lithium-aluminum slugs and measurements on weight and composition of the material have been made. The assembly of wafers into slugs is expected to be completed within a few weeks.

DECLASSIFIED

HW-74101

Ball 3X System Review

An over-all review of the Ball 3X safety system philosophy and criteria for the present Hanford reactors has begun. Approximately two months will be required for completion.

VSR Studies

A study was completed of the effect of various channel sleeving materials and rod sizes on the VSR strength⁽¹⁾. From this study, the following conclusions can be drawn:

1. B rods will be acceptable in the K Reactors.
2. Ceramic liners at most will result in loss of about three per cent in local control rod strength in the channels so lined. Graphite liners will increase the local control strengths of the VSR's by about three per cent.
3. Although B rods and liners are acceptable in C Reactor at present, they will probably not be strong enough in C Reactor after overboring.
4. B rods are acceptable in DR Reactor provided the appropriate alterations are made in total control requirements to take into consideration the weaker rods.

Advanced Reactor Technology

γ Heating

The computations of γ -ray escape and heating effects in the NPR lattice are being redone to cover the actual fuel geometry to be used. A Monte-Carlo, first-flight collision probability code is being used to determine the γ -ray collisions.

NPR Flux Decay

The flux decay following a scram in the NPR has been computed for various rod strengths. Although the program has no provisions for including the delayed heating of the fuel, the effect of the delayed heating on the reactivity and flux ratio will be small. The results have been used to determine the settings to be used on the "flux-decay-after-scram" trip for the Ball 3X system.

(1) HW-74046 - "Effect of C and K Control Capacity of VSR Liners", by C. E. Bowers, dated 6-19-62, (Secret).

RADIOLOGICAL ENGINEERINGRadiation Control Experience

The following table summarizes the radiation exposure experience of critical IPD classifications through 24 weeks of the 1962 badge year:

<u>Classification</u>	<u>Total Dose</u>	<u>No. of Employ- ees</u>	<u>Average Dose/ Employee</u>	<u>Extrapo- lated Year End Average</u>	<u>No. of Employ- ees over 3r Extrapolated Exposure</u>
Radiation Monitors	102252 mr	79	1294 mr	2803 mr	20
Processing Operators	278439	261	1067	2311	9
Pipefitters	125930	114	1105	2393	34
Millwrights	93234	94	992	2149	24

Lapse of Radiation Control

Lapse of Radiation Control
Distribution by Reactor and Component

	<u>B</u>	<u>C</u>	<u>D</u>	<u>DR</u>	<u>F</u>	<u>H</u>	<u>KE</u>	<u>KW</u>	<u>IPD Total</u>
Processing	0	6	0	0	0	0	2	0	8
Maintenance	1	2	0	1	0	0	1	1	6
Power	0	0	0	0	0	0	0	0	0
Supplemental Crews	0	1	0	0	0	0	0	0	1
Applied Reactor Engr.	0	1	0	0	0	0	0	0	1
Research & Engineering	0	0	0	0	0	0	0	1	1
Facilities Engineering	0	0	0	0	0	0	0	0	0
Central Maintenance	0	0	0	0	0	0	0	0	0
Reactor Areas	0	0	0	0	0	0	0	0	0
Assigned Totals	1	9	0	1	0	0	2	2	15
IPD General						1			1

Vertical columns do not necessarily add up to the indicated totals, because, in some cases, a Lapse of Control may be chargeable to more than one component.

Effluent Water Data

The table below shows average reported concentrations of selected radioisotopes from reactor effluent samples taken during May, 1962. Units are 10^{-12} curies/ml.

<u>Reactor</u>	<u>As⁷⁶</u>	<u>p32</u>	<u>Zn⁶⁵</u>	<u>Np²³⁹</u>	<u>Cr⁵¹</u>
B	59	9.1	14	340	180
C	92	9.5	19	130	390
D	100	11.7	280	340	1030
DR	104	4.6	27	120	480
F	74	10.8	88	140	860
H	77	10.2	58	---	---
KE	74	20.5	45	280	1800
KW	77	16.2	28	120	480

DECLASSIFIED

HW-74101

All old reactors continued at a nominal rate of 18 ppm alum in the water treatment process. Alum feed rate at Ks increased from 13 ppm to 18 ppm on May 21 as a result of unsatisfactory reduction at the lower feed rate. On May 22, the alum feed rate at KW was raised from 18 ppm to 20 ppm as the first step in a test of the usefulness of still higher alum feeds.

Experience to date with 20 ppm at KW has shown any significant reduction in P³² release as compared with 18 ppm.

Carbon-14 Study

A document describing the effects of C¹⁴ reactor effluents is being prepared in cooperation with HLO personnel. The document summarizes known facts about C¹⁴ discharged via the stacks and to the river in the past, along with data accumulated to date by the current study program. Analysis of all known data indicates that dose to workers in the river areas and to the surrounding populace due to Hanford C¹⁴ contribution is insignificant compared to natural background. The contemplated change in reactor atmosphere constituents currently being tested at the K Reactor would increase C¹⁴ by about a factor of ten (to ~1 c/day from eight reactors this is still an insignificant amount of C¹⁴ based on any hazard to people). The C¹⁴ released through the stack appears to be almost entirely the oxide form. Since animal organisms tend to discriminate against and eliminate CO₂, the dose from C¹⁴ taken into the body by breathing is almost infinitesimal. Dose from eating foodstuffs containing C¹⁴ would be the primary meat ingestion. Dose to persons in the Ringold area from food grown in the area would be 0.1 to 0.2 mrem/year, assuming a release rate of approximately 1 c/day.

PROCESS TECHNOLOGY OPERATIONREACTOR POWER LEVEL LIMITATIONS

By the end of this report period, the primary limitation to reactor power levels for all reactors will be bulk outlet temperature limits.

PROCESS STANDARDSHW-46000 B and D, Process Standards, Reactor

Three revised standards were issued during the month for each of these manuals. These were:

Process Standard C-050 - "Process Tube Temperature Monitoring"

The hourly temperature monitoring requirements of all process tubes during a reactor outage were deleted from the standard. Process tube temperature monitoring requirements for crossheader valve throttling after four outage hours were revised to permit more latitude in methods of temperature monitoring.

Process Standard D-070 - "Reactor Confinement"

The standard was revised to provide equipment specifications consistent with minor changes which were made to the equipment for calibrating the iodine monitoring instrumentation.

Process Standard E-010 - "Film Removal by Purging"

Former specifications for purging process tubes with diatomaceous earth were listed in the standard as "Advice." Since it has been demonstrated that process tube and fuel element jacket corrosion-erosion is a function of the amount of purging and concentration of inhibitor in the process water, these requirements were upgraded to mandatory conditions.

HW-46000 F and K, Process Standards, Reactor

One revised standard was issued for each of these manuals, and the index for the K Reactor manual was updated during the month. The revised standard was:

Process Standard E-010 - "Film Removal by Purging"

Revisions to this standard are identical to those made for HW-46000 B and D, above.

HW-46000 H, Process Standards, Reactor

Two revised standards were issued during the month. These were:

Process Standard D-070 - "Reactor Confinement"

DECLASSIFIED

HW-7-101

Process Standard E-010 - "Film Removal by Parging"

Revisions to these standards were identical to those made for HW-46000 B and D, above.

HW-46000 N, Process Standards, Reactor

One additional rough draft standard was added to the secret rough draft standards manual. This was:

Process Standard B-255 - "Rupture Monitoring System"

PROCESS CHANGE AUTHORIZATIONS

The number of process change authorizations issued during the month were: three to permit temporary deviation from Process Standards - Water Plant, HW-27155 Rev1; two to permit temporary deviation from Process Equipment Standards, HW-41000; and 18 to permit temporary deviation from Process Standards - Reactor, HW-46000. These were:

PCA #2-63 - "Ball 3X Functional Testing - C Reactor"

Process Standard C-110 specifies the frequency for functional testing of the ball 3X hoppers.

Three hoppers had not been tested according to the required frequency because of manpower limitations caused by high exposure rates. Authorization was given to delay testing these hoppers until May 31, 1962, provided the additional requirements of the PCA were met.

PCA #2-64 - "Emergency Cooling Water Requirements - KE Reactor"

Process Standard - Water Plant, 190-B-100, specifies the two acceptable pump configurations for backup water supply to the high pressure crosstie line (HPCT). One method cannot be used during six-pump operation. The second method requires five low-lift pumps supplying the reactor and the HPCT pressurized through the V-72 valves plus three service-water pumps supplying the 165 low pressure crosstie line.

Each of the two emergency generators supplying the low-lift pumps have only sufficient capacity to operate two pumps after pump impeller modifications under CG-883. KE Reactor has proceeded in the project to the point where two modified low-lift pumps are powered from one emergency generator bus, and one modified and one unmodified low-lift pump are powered from the second emergency generator bus. Therefore, at this time, only four low lift instead of the required five low-lift pumps can be powered by the emergency generators. Calculations indicate that the three modified and one unmodified low-lift pumps will provide as much flow as five unmodified low-lift pumps.

This PCA authorized until June 29, 1962 HPCT line backup with three modified and one unmodified low-lift pump, plus three service-water pumps supplying the low-pressure crosstie line.

PCA #2-65 - "V-73 Valve, KW Reactor"

Process Standard A-080 specifies that the V-73 valves in the high-pressure crosstie line (HPCT) be tested at least once per month.

Recently, the V-73 valve failed to operate during two successive tests, which were conducted two weeks apart.

Operation of KW Reactor was authorized provided the V-73 valve be tested once a day for four consecutive days, and, if tests are successful, to reduce testing frequency to once per week.

This PCA expired on May 17, 1962, when the V-73 valve at KW again failed to operate. The K Reactors were shut down to permit disassembly and inspection of the KW Reactor V-73 valve.

PCA #2-66 - "Turbine Pump Backup, F Reactor"

Process Standard - Water Plant, 190-B-070, specifies that seven steam turbines idling on automatic plus two steam turbines on manual shall provide emergency flow backup during reactor operation.

A steam leak developed in the 190 steam loop during operation which made available only six of the 12 steam turbines for backup flow. Since the power level at the F Reactor was only 80 per cent of the normal value during the 15-minute leak repair period, authorization was granted to operate with only six steam turbines available for backup water.

PCA #2-67 - "Gas Flow, C Reactor"

Process Standard B-010 specifies that the reactor gas flow be at least 400 cfm when the water collection rate exceeds 24 gallons per day. Authorization was given for eight hours to permit C Reactor to operate with gas flow less than 400 cfm per day when the condensate collection rate was 30 gallons per day, to permit data to be taken on possible correlation between gas loss and gas flow rates. During the period of low flow, the inlet and exit gas dew-points were low indicating adequate water removal capacity by the drier system.

PCA #2-68 - "V-73 Valve, KW Reactor"

Provisions and conditions of this PCA were nearly identical to those covered in PCA #2-65, above, covering operation subsequent to correction of the valve malfunction.

PCA #2-69 - "Water Leak, C Reactor"

Process Standard B-010 specifies the maximum condensate collection rate from the gas atmosphere be 24 gallons or less per 24 hours.

On May 18, 1962, water collection rate leveled off at 28 gallons per day. Past experience at C Reactor has shown considerable difficulty in leak

DECLASSIFIED

HW-74101

location when water collection rates are of this order of magnitude. Permission was granted to continue operation under specific conditions listed in the PCA until the leak became more significant and reasonable success in leak location could be anticipated.

The reactor was shut down on May 19, 1962, for leak repair.

PCA #2-70 - "Water Leak, DR Reactor"

Conditions and provisions of this PCA were nearly identical to PCA #2-69.

PCA #2-71 - "Graphite Thermocouple Stringers, H Reactor"

Process Standard C-040 was recently revised to require more thermocouple stringers than previously specified in the standard.

Several types of replacement stringers are being tested under Production Test IP-313-N and early procurement of necessary materials for fabrication of improved graphite temperature monitoring thermocouple stringers is anticipated.

Authorization was given to operate H Reactor with less than the required number of graphite stringers until the first minimum outage after August 19, 1962.

PCA #2-72 - "Crossunder Line Use - B, C, D, DR, F, and H Reactors"

Requirements of Process Standard A-030 pertaining to the newly installed crossunder line were based upon the supposition that the flow capacity of the line would be approximately five times greater than actually experienced under test conditions.

This PCA, based on actual flow capacity, permitted use of the crossunder line until August 1, 1962, under the specific conditions listed in the authorization.

PCA #2-73 - "VSR Withdrawal, H Reactor"

Process Standard C-100 permits all VSR's to be removed from the reactor for testing during an outage, under certain specific conditions, one of which is process water at normal operating pressures.

During the rod drop time tests where all rods were to be photographed for their positions following a specified time after the #1 safety circuit was tripped, it was not desirable to raise the water pressure for economic reasons.

The PCA authorized all VSR's out for the above test, provided the specific detailed requirements of the PCA were met.

PCA #2-74 - "Horizontal Bowing Measurements - B, D, and F Reactors"

Process Standard G-010 specifies that graphite moderator distortion be measured annually.

Newly designed traversing equipment is now available; however, its accuracy has not been thoroughly evaluated.

To permit additional time for evaluation of the equipment accuracy, the PCA authorizes a delay in taking required horizontal bowing measurements until August 31, 1962.

PCA #2-75 - "Water Leak, DR Reactor"

Conditions and provisions of this PCA are nearly identical to those presented in PCA #2-69.

PCA #2-76 - "Front Face Work Platform Control Circuit, KW Reactor"

Process Equipment Standard D-050 specifies that during operation the front face work platform-reactor interface be monitored for obstructions by a device that will automatically break the up-down work platform circuit if an obstruction is detected.

During May, the protective interlock failed when it was necessary to accomplish spline work for reactivity adjustments.

Procedural controls, as specified in the PCA, were authorized for one day to permit front face work platform usage while the interlock was repaired.

PCA #2-77 - "Tube Power and High Pressure Dump Valve Limits, KER Loops"

Maximum tube power limits in Process Standards K-010 and K-040 were based on the pressure relief valve capacities of the KER loops. Higher tube powers were authorized in this PCA, provided a means for depressurizing the loop through the dump valve, by a loop high pressure signal, was installed and accepted.

PCA #2-78 - "Gas Atmosphere, C Reactor"

Process Standard B-010 specifies the permissible limits for contaminants in the reactor gas atmosphere.

Recent graphite monitoring samples from all eight reactors indicate a significant increase in burnout rate of the graphite moderator.

This PCA supplements Process Standard B-010 until the standard can be changed by introducing more restrictive limits on gas atmosphere dewpoints, per cent oxygen, per cent nitrogen, and pressure with respect to the adjacent atmosphere.

PCA #2-79 - "Removal of Export Pump, H Reactor"

Process Standard - Water Plant, 190-B-070, specifies that an emergency steam pump shall be placed on the export system if electrical power is lost in a reactor area. This ensures adequate backup water if a power failure occurs at all areas and steam is lost in one area.

DECLASSIFIED

HW-74101

On June 6, 1962, the emergency steam pump governor at H Reactor needed repairs. Based upon the number of reactors down in dual reactor areas, authorization was given to take the export pump out of service at H Reactor for needed maintenance. Specific operating requirements were stated in the PCA.

PROCESS ASSISTANCE

One engineer audited conformance to process standards on all Processing Operations' shifts by making 16 inspections at each reactor during the report period.

RUPTURE EXPERIENCE

<u>Failure Date</u>	<u>Tube Number</u>	<u>Lot Number</u>	<u>Type of Material</u>	<u>Tube Power at Failure (kw)</u>	<u>Exposure MWD/T</u>	<u>Type of Failure</u>
6/14/62	3065-D	HZ-060-D	I&E NB	1107	533	Unclassified
6/18/62	3378-D	HZ-060-D	I&E NB	1232	600	Side-Other
6/25/62	2272-F	KZ-307-A	I&E N	1168	486	Side Hot-Spot
6/26/62	1268-DR	UZ-068-B	I&E N	910	455	Unknown

Legend

I&E NB - This is the symbol for internally and externally cooled production reactor fuel elements of natural uranium which have projections (bumpers) welded to the fuel element jacket.

I&E N - This is the symbol for internally and externally cooled production reactor fuel elements of natural uranium.

Unclassified - The failure did not logically fall into any of the usual types.

Side-Other - Failure probably caused by corrosion or water penetration of the external can wall or other unknown mechanism.

Side Hot-Spot - Failure probably caused by accelerated corrosion of the external can wall in a localized region of high temperature.

OPERATIONAL PHYSICS OPERATIONPILE PHYSICS ASSISTANCE

All reactors are presently limited by bulk temperature or tube corrosion limits; the latter aspect provides continued incentive for the high flattening efficiency which is being maintained.

Tests to determine physics parameters were run at several of the reactors during the report period; they consisted of scram transient tests and rod-worth comparison measurements.

SUMMARY OF OPERATION DATA OF PHYSICS INTEREST
FOR THE MONTH OF JUNE, 1962

Reactor	B	C	D	DR	F	H	KE	KW
ECT in June (1)	1515	1670	1515	1485	1480	1530	2500	2575
12-Month Average ECT	1495	1680	1480	1470	1470	1515	2535	2540
Equil. Scram Time (2)	23-27	23-27	14-16	30-35	15-20	14-16	20-25*	25-30*
Recording Period -								
From:	5-21	5-21	5-23	5-22	5-22	5-22	5-21	5-21
To:	6-21	6-21	6-21	6-20	6-20	6-20	6-20	6-20

*Equilibrium scram recoveries are not attempted at the K Reactors.

1. **Effective Central Tubes:** This value is defined as pile power level divided by the average power of the ten most productive tubes in the reactor.
2. This is defined as the maximum time available in minutes between scram and first indication of startup.

B Reactor - J. R. Fredsall

Operation was characterized by high time-operated efficiency during the report period, and equilibrium power was limited by the bulk temperature limit.

B Processing Operation has made plans for gradual elimination of PCCF (Poison Column Control Facility) columns in favor of splines; this transition will permit a significant decrease in the enrichment inventory.

The enriched core for partial xenon override (PT IP-467-C) continued under irradiation. A calibration of rods through the enriched core was successfully carried out subsequent to the report period (on June 25).

C Reactor - D. W. Constable

Large-scale tube replacement together with other cutage work limited operating time considerably. One of the lower quadrants of the reactor was very cold

DECLASSIFIED

DECLASSIFIED

HW-74101

following the startup of June 11; the reactivity effect observed was of the order of one per cent k.

Brief rod comparison measurements have been made during nearly every startup and for high reactivity startups (requiring 100 or more splines); a worth of ~250 c-mk was indicated for number 8 (central) rod.

D Reactor - D. G. Albertson

Although D Reactor has experienced several ruptures recently, it is not felt that flux distortion has been a major contributor; however, a systematic flux-mapping program will be carried out to ascertain any abnormal flux distributions.

A return to high goal exposure has permitted a substantial decrease in spike enrichment investment and an increase in ECT.

DR Reactor - J. W. Hagan

Prior to an extended tube outage, DR Reactor experienced a 26-day operating period. Insufficient coolant flow recently caused the failure of one sub-critical monitor. The instrument has been repaired and is in service.

A scram transient test (following of the initial shutdown transient by holding low-level critical) was carried out on June 9. No trouble was experienced with the Panellit board in the safety system during the entire test (production test provisions generally allow its bypassing at low levels under specified monitoring conditions).

F Reactor - A. W. Medcalf

Operation subsequent to a tube outage has included relatively long and steady operating periods at bulk outlet water temperature limits.

H Reactor - L. L. Grumme

A three-Beckman scram occurred during a hot startup attempt on June 1 when the Beckmans were reranged to a lower sensitivity than is required and the subsequent switching could not be effected fast enough to avoid the trips.

Axial flux distribution from a PT 216-A traverse near a number of short charges indicated no distortion; the shutdown spline data reported in May are therefore suspect. Additional information is being obtained from operating traverses.

KE Reactor - D. E. Newbrough

Operation this report period has been good with a long operating period and a scheduled outage. Reactivity gains caused by an unusually high exposure required continual splining and careful control. VSR's have been maintained in good operating condition by broaching some parts of #49 channel; the complete system is in service.

Mixers have been included in the metal charges, and during the June 18 outage 2200 of them were charged in 1100 tubes. A new half-rod is scheduled to be inserted in number 17 position, bringing the number of half-rods at KE to six. Additional enrichment has been added near the two loops testing NPR fuel elements in order to increase the local power in these facilities.

KW Reactor - R. A. Chitwood

Operating continuity was excellent during the report period, and flattening efficiency was above average as a result of high fringe exposures.

Several VSR's did not meet the required drop time during outage tests, but maintenance efforts were successful in precluding startup restrictions.

PROCESS PHYSICS STUDIES

Safety Control Studies

Applicable control rods at B Reactor were calibrated through the partial-xenon-override core during five hours of rising period measurements prior to startup on June 25. Results of these measurements, carried out under Supplement A of PT IP-467-C, will be reported as soon as the data have been analyzed.

An 11-node analog model for nuclear instrumentation criteria studies has been working successfully during the month and will now permit the completion of a number of cases of distorted flux distributions prior to scram.

Analysis of IR Reactor cold startup data indicated a burnout recovery of approximately 150 c-mk from the residual boron-steel balls left by the 1961 ball 3X drop. The number of compensating enrichment columns allowed within total control limitations was correspondingly reduced.

A new set of period vs. reactivity tables was generated for the Pile Physics Manual. Bases include effects of exposure and enriched fuel inventory as well as currently accepted delayed neutron constants.

The reactivity and control effects of vertical channel lining sleeves in C and K were calculated and documented as HW-74046, "Effects on C and K Control Capacity of VSR Liners."

Reactivity Studies

Effective July 1, 1961, the IPD production accounting program was normalized on the basis of 12 2-ton test batches and routine CPD recovery experience. Subsequent experience has demonstrated that the 1961 normalization was successful; only minor modifications will be recommended for the July, 1962, normalization. The predicted yield in natural uranium will be increased approximately one-half per cent and the predicted plutonium yield in E-metal will be reduced about one per cent. The net effect on IPD total plutonium predictions will be of the order of 0.1 per cent.

DECLASSIFIED

HW-74101

The purity test program for the NPR graphite stack has been completed with the publication of HW-72654, PT 3, "NPR Stack Purity Tests - Description, Analysis, and Results." Other parts of this series are Part 1, "Experimental Variations of Absolute Count Rate Method"; PT 2, "Test Authorization"; and PT IV, "Rough Data" (single copy).

The NPR startup physics document, to be issued as HW-72345 following authorization, has been circulated in rough draft form for comment by the intended signatories. The suggested addition of a test for evaluating the reactivity effect of the water in the graphite cross-coolant channels is being investigated.

A qualitative study on the effects of channeled recirculating flow in the NPR, as opposed to use of a mixing header, indicate that feedback control effects should not lead to divergent oscillations.

Reactor Efficiency Studies

Indications that the spline vendor can provide a thin cladding give some promise that grey splines for producing useful isotopes may be feasible.

HW-73615, Supplement 1, "Addendum on Corrosion Aspects, E-N Demonstration Loading," was issued during the month to adequately qualify the tube corrosion predictions given in the parent interim report having the same document number.

A reactor efficiency study to determine effects on conversion ratio and operating efficiency of various changes in operating conditions during the past five years has been initiated. The first step in this study was to determine whether or not observed variations in conversion ratio over the past few years could be logically explained by the differences in operating practices, primarily as compensated by increased use of E-metal; this step has been completed successfully. The second step now underway is to isolate the different operating changes which require E-metal compensation (such as dummy tubes, more excess in rods, etc.), and to ascertain the extent to which each specific change may be justified by its contribution to increased reactor output.

TESTING OPERATIONIRRADIATION TESTING OPERATIONH-1 Loop

The H-1 Loop facility continued to operate with the irradiation authorized by PT IP-450-D. The irradiation accumulated 204 hours at reference conditions. The total irradiation exposure to date for these samples reached 259 hours at reference conditions of 550 F and 1800 psi. Operation of the loop on an automatic basis with single-shift technician coverage has been satisfactory.

Calibration of the surge tank liquid level by a radiographic technique was completed and results indicated approximately a seven-inch discrepancy from conventional calculation results.

Borescoping Activities

VSR Channel No. 47, C Reactor - This channel was examined to assist in the removal of broken graphite lying in the bottom of the channel.

HCR Channel No. 3, KE Reactor - The channel was examined to determine if any balls were in the channel. None were observed, but the rod had rubbed the channel at several places.

KER-3, KE Reactor - This tube is given a routine examination after each discharge to detect any damage or changes. Nothing significant was noted.

Process Tube 3665, KE Reactor - This tube was examined to determine whether or not any damage had resulted from a stuck charge. The only damage observed was a dark spot (possible burn) on the side of the tube at 18 feet.

Process Channel 3184 and 3063, DR Reactor - These channels were examined prior to retubing to determine the condition of the graphite. Both channels were in good condition except for the normal split blocks and graphite separations.

Process Channels, C Reactor - Several channels were examined before and after broaching to determine the amount of damage done by the broaches. Very little damage was observed from the broaching operation.

Vertical Bowing Measurements - Following is a summary of the vertical bowing measurements. All distances are measured from the inlet tube flange.

Tube No. 5065-KE	No previous data
Tube No. 3665-KE	No previous data
Tube No. 5196-KE	No previous data
Tube No. 5767-KE	No previous data

DECLASSIFIED

Sample and experiment irradiations were handled as follows:

Reactor	Test Hole	Facility	Request No.	No. of Samples	Material-Purpose
KE	2D	Quickie	HAPO-184	10	Washington Designated Program
B		Process Channel	HAPO-098	10	Graphite (burnout rate study)
D		Process Channel	HAPO-098	10	Graphite (burnout rate study)
DR		Process Channel	HAPO-098	10	Graphite (burnout rate study)
C		Process Channel	HAPO-098	25	Graphite (burnout rate study)
KE	2D	Quickie	HAPO-172	7	Various chemicals (effluent water radioisotope reduction study)
KE	2D	Quickie	HAPO-252	3	Arsenic (isotope production)
F	E	Quickie	HAPO-219	4	Strontium (isotope production)
F	E	Quickie	HAPO-223	3	Graphikote-wax (process tube lubricant radioisotope build-up study)
F	E	Quickie	HAPO-223	2	Inconel (activity buildup study)
KE	2B	Magazine	HAPO-265	1	Boron-aluminum spline (boron burnup rate determination)
KE	2D	Quickie	HAPO-256	4	Plutonium (fission yield of heavy plutonium isotopes)
F	E	Quickie	HAPO-229	1	UO ₂ (fission damage study)
KW	4B	Snout	HAPO-243	21	Molybdenum (fast neutron damage study)
KW	4C	Snout	HAPO-258	3	Molybdenum (fast neutron damage study)
F	E	Quickie	HAPO-251	4	Cobalt (fish tags)
C	B	Hot Graphite	HAPO-250	2	Ceramic materials (control and safety rod channel liner material)
DR		PCCF	HAPO-172	2	Various chemicals (effluent water radioisotope reduction study)
DR		PCCF	HAPO-254	6	Various chemicals (effluent water radioisotope reduction study)
KE	2B	Magazine	ORNL-198	1	Antimony (isotope production)
KE	2B	Magazine	ORNL-204	1	Mercury (isotope production)
		*Gamma	HAPO-171	3	Plastics (damage study)
		*Gamma		1	Bellows (damage study)

*Gamma Irradiation facility is located in Building 105-KE storage basin

COOLANT TESTING OPERATION

KER Loop Operation

KER-1 and KER-2 - Remained shut down for CGI-839 modifications. Because of the strike of construction forces, no work was accomplished for four weeks. Work was resumed June 13.

KER-3 - The eleven 23-inch NAEI fuel elements and thermocouple train were discharged on June 18. The process tube was borescoped and was re-charged with eleven 23-inch NAEI fuel elements. A thermocouple train for measuring coolant temperature patterns was placed downstream of the fuel elements.

Following the May 23 outage, the loop was on single-pass operation because of a leak in the rear tube-to-nozzle joint. This leak was repaired during the June 18 outage. The in-reactor recirculation operating conditions as specified in PT IP-477-A are 285 C maximum, 1555 psi, and pH 10.

KER-4 - Testing of fourteen 23-inch NAEI fuel elements as authorized by PT IP-477-A continued. The objective of the test is to evaluate the irradiation behavior of N Reactor fuel elements equivalent to, or more severe than those expected in N Reactor. In-reactor recirculation operating conditions are 285 C maximum, 1555 psi, and pH 10.

Following the May 23 outage, the loop was on single-pass operation because of a leak in the rear nozzle-to-tube joint. In-reactor recirculation operation was resumed following the June 18 outage.

1706-KE Single-Pass Tube Operation

SP-5 (4557-KE) and SP-6 (4863-KE) have been supplied service water from 1706-KE adjusted to pH 6.6 and with 1.0 ppm sodium dichromate added. As control tubes, SP-1 (2952-KE) and SP-2 (3050-KE) are being supplied normal process water from 1706-KE. The objective of the testing, authorized by PT IP-475-AL is to compare the corrosion of aluminum clad fuel elements in pH 6.6 water containing 1.0 ppm sodium dichromate and in pH 6.6 water containing 1.8 ppm sodium dichromate.

SP-4 (4456-KE) has been supplied normal process water from 1706-KE with 10 ppm sodium silicate added as authorized by PT IP-484-A. SP-7 (4963-KE) is being supplied normal process water from 105-KE as a control tube. This test is being conducted in conjunction with the effluent activities program.

SP-3 (4355-KE) has been supplied normal process water from 105-KE Building.

SP-8 (5063-KE) has been supplied deionized water from 1706-KE as authorized by PT IP-449-A and Supplement 1 of the Production Test. This test is being conducted as part of the effluent activities reduction program.

KE Outage Time Requirements

One unscheduled outage was charged to production testing. The May 23 outage was a result of a short circuit in the secondary winding of the KER-1 boiling point suppression instrument power supply transformer. A total of 29.1 outage hours was charged to production tests as listed below.

<u>Production Test</u>	<u>Description</u>	<u>Hours</u>
PT IP-448-A	Borescope KER-1 process tube	3.2
PT IP-484-A	Repair of front face valve	0.3
PT IP-477-A	Reactor scram	6.4
	Discharge and recharge KER-3, Borescope KER-3, Repair tube-to- nozzle seal KER-3	19.2

Out-of-Reactor Facility Operation

TF-1 - Testing to evaluate fatigue and stress resistance of carbon steel and stainless steel welded samples treated in sodium bisulfate decontamination process was completed. No further testing has been scheduled.

TF-3 - Testing continued to evaluate the cladding characteristics of Zircaloy-2 under conditions of heat transfer and the corrosion characteristics of 316 stainless steel, 304 stainless steel, A-212 carbon steel, and Zircaloy-2 at 580 F, 1985 psi, and pH 10.

TF-4 - Testing to determine the corrosion and crud release rates in a system approximating that specified for the NPR graphite cooling system continued. Corrosion samples of A-212 carbon steel, 304 stainless steel, and Zircaloy-2 are charged in the loop. Operating conditions are 200 psi, 200 F, and pH 10.

TF-5 - After a conditioning run, testing was started to evaluate the effects of pH on A-212 carbon steel, 304 stainless steel and Zircaloy-2 corrosion. Operating conditions are 1400 psi, 290 C, and pH 8.0.

TF-6 - Corrosion testing of A-288 and X-8001 aluminum, A-212 carbon steel, 304 stainless steel, and Zircaloy-2 continued at 1450 psi, 300 C, and pH 4.5 adjusted with chromic acid.

TF-7 - Testing to determine the effectiveness of a sodium benzoate and sodium dichromate mixture as a corrosion inhibitor continued. The test sections contain the following materials or components.

1. A PRTR fuel element which is being used to evaluate the potential fretting corrosion on a PRTR process tube.
2. Two dummy fuel elements and two NIN fuel elements for corrosion testing.

3. One KSE3 fuel element for corrosion testing.
 4. Corrosion samples of carbon steel, stainless steel, Zircaloy-2 and aluminum for the inhibitor testing.
- Testing conditions are 1600 psi, 570 F, and 123 gpm flow.

TF-8 - Corrosion testing of samples of carbon steel and stainless steel, and Zircaloy-2 continued at 1200 psi, 280 C, and pH 10. The test objectives are to obtain corrosion data pertinent to the NPR primary system. Two 23-inch NAEI elements occupy one test section for the purpose of obtaining data on abrasion resistance of the element supports.

TF-9 - Testing of special fuel assemblies to determine the weight loss of bare uranium was continued. Six test runs at 1800 psi and 300 C were completed.

TF-13 - Corrosion testing of carbon steel at 700 F and 125 psi continued.

TF-15 - High temperature corrosion testing of carbon steel, stainless steel, Zircaloy-2, Hastelloy-X and Allegheny Ludlum D-979 was completed on June 14. Operating conditions were 4800 psi, 900 F and pH 6.5. Loop conditioning and test runs are in progress with ammonium hydroxide and hydrazine addition to the feed water.

Design Test No. 1134 - Hydrostatic Cycling of NPR Primary Pipe Specimens -
Four pipe specimens have been run to failure, and testing of a fifth specimen is in progress.

COMPONENT TESTING OPERATION

Irradiated Fuel Element Examination

Examinations were completed on the fuel elements from 52* tubes.

<u>Number of Tubes</u>	<u>Production Test</u>
26	PT-216-A, Evaluation of Performance of Normal Production I&E Fuel Elements
5	PT-272-A, Pilot Test of Self-Supported Fuel Elements in Ribless Zirconium Process Tubes
2	PT-310-A, UT-2 Program - Bumper Fuel Element
10	PT-381-A, Irradiation of Oversize Fuel Elements in the C-Reactor Overbored Process Channel Facility
1	PT-409-A, Pilot Test of Self-Supported Fuel Elements in K Size Smooth-Bore Zirconium Process Tubes
8	PT-432-A, Evaluation of the Corrosion Characteristics of Elliptical Bumper Rails

*Equivalent to 213.18 fuel examination units as established May 15.

Process Tube Corrosion Monitoring Program

In-reactor measurement of 349 process tubes was completed. The number of tubes measured for each reactor and document numbers of the reports issued are as follows:

<u>Reactor</u>	<u>Number of Tubes Probologged</u>	<u>Report No.</u>	<u>HW Number</u>
C	43	41	73851
D	40	42	73852
F	51	43	73925
KW	87	44	74026
B	75	45	74027
KE	53	46	74058

Visual examination was completed on seven process tubes as follows:

<u>Reactor</u>	<u>Number of Tubes</u>	<u>Reason Removed</u>	<u>HW Number</u>
C	6	2 - leakers 1 - rupture 3 - routine	74059
D	1	Tube outlet flange failure	74018

Critical Reactor Component Examination

All of the snap rings on the front tube sleeves at KE Reactor were examined. A gap 3/8 of an inch or greater was found on each of seven rings.

A process tube, removed from H Reactor, was examined and sampled. The samples were taken to Radiometallurgy, Hanford Laboratories Operation.

Panellit System Programs

Gauges repaired, calibrated by maintenance	-	111	
Gauges meeting calibration criteria	-	58	(52%)
-previous month	-		(59%)
In-board gauge reliability examination	-	230	
Gauges meeting examination criteria	-	215	(93%)
-previous month	-		(96%)
-average for past year	-		(93%)
Response time determination	-	230	
Gauges meeting examination criteria	-	230	(100%)
-previous month	-		(99%)
-average for past year	-		(84%)
In-board Bourdon coil examination	-	510	
Non-leaking coils	-	505	(99.01%)
-average rate past two years	-		(99.48%)

Gauge failures receiving analysis	-	64	
2B-X1 switch examination	-	1041	
-rejection rate	-	240	(23%)
-previous month	-		(29%)
Rebuilt gauges -- received from vendor and examined	-	1046	
-rejected this month	-	83	(7.8%)
-rejected last month	-		(5.4%)
Gauges removed from panels and prepared for shipment to vendor as exchange gauges	-	1292

O. H. Greager
Manager, Research and Engineering

RECEIVED

DECLASSIFIEDFACILITIES ENGINEERINGREACTOR MODIFICATION DESIGN

The design of modifications in support of the zirconium process tube replacement program at the 105-K Reactors has continued. Flow testing of a complete nozzle, process tube and fuel element chain has been satisfactorily completed with the system pressure drop of the new assembly equal to that of the presently installed equipment. Fabrication of prototype impact extruded inlet nozzles by the vendor is proceeding with no significant problems encountered to date. Design testing of alternate front and rear face gas seals, snap ring groove modifications and snap ring materials is underway. Design has been completed and shop fabrication started on a prototype gunbarrel snap ring regrooving tool.

A graphite distortion problem program document (HW-73778) which reviews the status of pertinent design and development programs currently underway and outlines the expected problem areas on which additional engineering effort will be required has been issued. Preliminary schedules are shown for current and planned development programs in support of the vertical safety rod and horizontal control rod operational and graphite distortion problems.

Drop testing of a 105-C Reactor size flexible vertical safety rod in a VSR channel lined with polycrystalline graphite sleeves has continued. The tests completed to date have indicated that the liner sections will not be satisfactory for a $2\frac{1}{2}$ inch horizontal channel displacement in a six foot arc due to wear and breakage of the liners from VSR impact. Additional tests are underway on a channel having a $1\frac{3}{4}$ inch displacement which approximates the maximum channel distortion which has been observed to date in the reactor. Alternate VSR tip arrangements to reduce the impact of the rod striking the liner in the $2\frac{1}{2}$ inch displacement tests were unsuccessful. Rod drop tests in a channel section filled with 3X balls resulted in failure of the liner section at the ball level due to rod impact. Additional rod drop tests are being made to determine the internal pressure in the channel resulting from the impact of the rod into the balls.

Two sets of samples of alternate VSR ceramic liner materials have been discharged from 105-C Reactor after an integrated reactor exposure of 4×10^{20} nvt. These samples of aluminum oxide, aluminum silicate and nitride bonded silicon carbide have been sent to Radio Metallurgy Laboratory for testing to determine the irradiation effect upon these materials. Additional samples will be removed from the reactor over a bi-monthly schedule for the next twenty months.

An evaluation has been completed of the modifications required for installation of a B size flexible vertical safety rod in 105-DR Reactor. Listings of the necessary replacement components and designs for a step plug sleeve insert have been prepared. The use of the smaller B size rod in 105-DR Reactor is being undertaken in order to improve the speed of VSR insertion time on several of the VSR channels which are currently indicating

evidence of binding. Design work has been started on the modifications necessary to permit installation of a B size vertical safety rod on an interim basis at the 105-K Reactors. A safety analysis has indicated that the use of these smaller diameter rods will provide adequate control strength at the K Reactors.

The inlet and outlet nozzle snap rings which retain the nozzle lug rings on the overbored fuel test facility hardware at 105-C Reactor have been replaced. The existing rings which were installed as an interim measure until more suitable materials could be procured were cadmium plated carbon steel and are somewhat vulnerable to stress corrosion. These rings were replaced with similar rings of Armco PH 15-7 MO which has exhibited excellent stress corrosion characteristics in tests to date. A total of 42 snap rings were removed from the reactor and nine of those which were removed from the rear face were found to be cracked. No evidence of cracking or corrosion was found on any of the snap rings from the front face of the reactor. Laboratory corrosion testing of Inconel-X as an alternate snap ring material is continuing.

Design testing of the 105-C Reactor replacement rear nozzle elbow and rear connector has been satisfactorily completed. The connector samples failed on cycling in the range of 4-5,000 cycles which is equivalent to about 200 years of reactor startup. Performance of the prototype elbows and connectors installed on the reactor for evaluation continues to be satisfactory.

DECLASSIFIEDEQUIPMENT DEVELOPMENTTube Replacement

Three hundred ninety-nine tube channels at 105-C Reactor and 275 channels at 105-DR Reactor were drilled with the new drill drive unit and cutter assembly described in the April report. Only two new tubes stuck and were lost on insertion at C Reactor although approximately 30 were lost at the DR Reactor. This experience continues to support the hypothesis that the more cutting tools passed through the channel, the lower would be the incidence of tubes stuck on insertion. The higher percentage of tubes lost at DR Reactor is attributed in part to the already loosened graphite block condition at that reactor.

VSR Channel Restoration

Cleaning of VSR channels was initiated at 105-C Reactor on June 21. Channel #47 was entered and two block ends approximately four inches thick that were lodged in the channel were drilled with a 1-23/64 inch drill bit. The initial hole was subsequently opened to 2-3/8 inches to allow passage of the television camera. This channel is now open to permit bottom removal of ball 3X balls in the normal manner. Additional channel restoration effort was abandoned when the 1-5/8 inch drill bit came loose and lodged in the ball 3X piping below the unit. Preparatory work is under way to permit removal of the bit during the next reactor outage. Laboratory testing of VSR channel-enlargement tooling is continuing in the 195 Test Tower. The chain-saw concept cutting tool has been laboratory tested and it is planned to be used on-reactor during July.

K Reactor Graphite Channel

Design of the 100-K Reactor one-tube graphite channel mock-up facility was completed on June 23. The mock-up is being constructed to permit development of tooling and demonstration of tube configuration for predicted graphite conditions at the K Reactors. Construction work is in progress and the mock-up is approximately 70 per cent complete.

Operational Fueling

Cavitation tests of the Venturi mounted on the nozzle were concluded in the laboratory on the K Reactor mock-up. Test results reveal that no damage occurs to the inlet connector during operation with the tube empty. All test data is reported in HW-73874, dated June 14, 1962.

Design Test Service

The NPR program utilized 524 hours of engineering effort for design test service.

PLANT ENGINEERING

DRAFTING

Services provided during the month:

New and revised drawings	263
Layouts and sketches	84
Microfilm prints reproduced	570
Microfilm drawings added	2350
Microfilm drawings voided	625
Ozolid check prints reproduced	1367
Catalogs added to files	8
Customers serviced - microfilm files	285
Customers serviced - catalog files	52
BPF's and specifications added to files	7

REACTOR, PLANT ENGINEERING

Production Test IP-352-AE, Rear Face Piping Examination

Removal of a complete rear crossheader from DR Reactor for mechanical and metallurgical examination was authorized under Production Test IP-352-AE. Header No. 19 $\frac{1}{2}$ -DR was removed June 16 and 17. No significant problems were encountered in performing the work and the job was completed in approximately 40 hours, about eight hours ahead of schedule. The old header was sent to the 2706-W Building, 200-W Area for preliminary examination and for decontamination. Prior to detailed examination, preliminary visual inspection showed no obvious signs of deterioration. The header was replaced with one of improved design, incorporating expansion joints and removable fittings as authorized under Production Test IP-441-AE.

Design Change No. 527 - C Reactor Front Connectors

Design Change No. 527 was issued to authorize replacing faulty front face Type 304 stainless steel connectors at C Reactor, with Inconel connectors of similar design. In the absence of conclusive test data on the fatigue properties of Inconel, the Design Change was issued with a time limit qualification. Fatigue properties of Inconel have been established by test to be essentially the same as Type 304 stainless steel. This is considered satisfactory for the service and an alteration to the design change has been issued removing the time limitation on use of this material.

Remote Operation - 115 Buildings, B/C, D/DR, and H

A study of the feasibility of operating the B, C, D, DR, and H Reactor gas treatment facilities remotely from the reactor control room has been completed. Document HW-73892, "Remote Operation - 115 Buildings, D/DR, B/C, and H, Feasibility Report," has been issued and reports favorably on the proposal.

WATER PLANT & UTILITIES ENGINEERING

DECLASSIFIED

Voltage Studies

Development Test DT-IP-511-E, Voltage Recording Tests - 105-F, HW-73973, was approved and issued. The objective of this test is to determine voltage surges incidental to startup of major pieces of equipment and the effect on reactor safety instrumentation. Necessary instruments have been installed in preparation for the actual tests.

Columbia River Studies

Cooler than normal weather has retarded runoff. The peak flow occurred on June 19, 1962, and was 320,000 cfs. which was a controlled flow, and corresponds to a 390,000 cfs natural flow. Storage of water in Grand Coulee Reservoir was started on June 17. The high flow on June 19, 1961 was 483,000 cfs, however, the 1961 season peak flow was approximately 530,000 cfs. River temperature at Priest Rapids on June 19, 1962 was 13-1/2°C which corresponds to a 15.3 C for a normal year; 18.3 c in 1958, and 14.5 C in 1961.

PROJECT ENGINEERINGCGI-839 - Modification of Fuel Element Test Facilities - 1706-KER

Primary Pump No. 1 in Cell No. 4, which failed because of a broken impeller on May 4, has been dismantled and the shaft assembly and bearings have been returned to the vendor. The case of the pump has not been decontaminated sufficiently to be shipped off-site, but decontamination is continuing and it is believed that this can be accomplished successfully. Repair at the factory awaits the receipt of the pump case.

Pump No. 2 was removed and dismantled for inspection because of a hot thrust bearing. A leak in the heat barrier caused the overheated bearing. During the inspection of this unit, deterioration of the chrome plating on the pump shaft was observed and photographed. The vendor's chief metallurgist inspected this unit and recommended that the pump be repaired and reassembled using all the existing parts except that a new thrust plate and new thrust shoes be installed. The pump is presently being assembled but cannot be completed until a new thrust plate is received from the vendor.

CGI-844 - 100-K Area Coolant Backup

A dual outage for 105-KE and KW has now been firmly scheduled to start on July 16 and is expected to be of four to five days' duration. During this outage, final tie-ins will be made for all process piping, and all equipment installed on the project will be operated in a final acceptance test. Intermediate acceptance tests have been successfully completed on the steam turbine driven pumps installed in 190-KE and KW. Intermediate ATP's are now being performed on the diesel driven pumps installed in the new 183-K Building.

A revision to the project proposal is being prepared requesting an extension of time to August 31, 1962.

CGI-883 - Increased Process Water Flow - 100-K Area

During a scheduled reactor outage at 105-KE on June 18, low lift and high lift process pump unit No. 4 was installed. Two additional submersible pumps have been installed in the 181-KE river pumping station, bringing the total of new pumps installed at that building to three.

CGI-904 - Improvements to Gamma Monitoring Systems, 105-B, C, D, DR, F and H Buildings

Installation of new sample room components was completed in the far side sample room at 105-C on June 8, 1962. Reworked flow regulators are being received from the manufacturer and will be installed in all except the 105-H Building. The pressure and flow conditions of three to eight pounds per square inch pressure fluctuation at 50 to 80 cycles per second in the gamma monitoring lines at 105-H Building present additional problems. The regulators installed at 105-H will be removed from service as soon as possible and the needle valves reinstalled until the problem is solved.

CGI-933 - Water Treatment Pilot Plant, 100-K Area

Final items of work are now in progress. Run-in of equipment and functional checking are scheduled for completion July 1.

CGI-966 - Safety Circuit Trip Identification Systems, 105-B, C, D, DR, F and H Buildings

HOL-AEC Directive HW-539, dated May 29, 1962 was received.

CGI-967 - High-Speed Scanning System for Temperature Monitors, KW Reactor

HOO-AEC Directive HW-538, dated May 24, 1962, was received. Preparation of Design Criteria and Scope is in progress.

MJA-21, 25, 29 - Pressure Monitor Modification and Repair, 105-C, KE/KW, and H Buildings

	<u>C</u>	<u>KE</u>	<u>KW</u>	<u>H</u>
Gages installed this period:	310	464	0	0
Gages installed to date:	1,900	2,649	2,074	1,798

Switches accepted to date: 8,530

MJA-42 - Interior Painting, Process Water Storage Tanks, 100-B, F, H, and DR

The painting estimate as well as the cathodic protection estimate included in MJA-42 have been completely reviewed and new estimates prepared. Revision 1 to MJA-42 has also been prepared based on the new estimates, and a recommendation is being transmitted to the HOO-AEC that this revised MJA be approved in the amount of \$400,000 to authorize coating of the inside surfaces of the 190 Building storage tanks.

R-20520 - K Retubing

On June 22, 1962, an order for 5,200 zirconium tubes at a price of \$537.00 per tube was placed with the low bidder.

Project Proposals Submitted to AEC

CGI-974 - Analog Simulator, 100-N

Directives Received

CGI-966 - Safety Circuit Trip Identification Systems, 105-B, C, D, DR, F and H Buildings

CGI-971 - 1706-KER Ventilation Improvements

CPFF Construction Service Contractor-Liaison

Issued one new work order and supplemented no old jobs for a total of \$1,470 to J. A. Jones Construction Company. Jones employees returned to work June 13 after the carpenters' strike.

Plant Forces Work Review

The Labor Standards Board approved six jobs for assignment to plant forces, estimated to cost \$265,083.00.

Manager, Facilities Engineering

RT Jessen:dgm

DECLASSIFIED

NPR PROJECTPROCESS DESIGN OPERATIONProcess Research and Development

A comprehensive fatigue analysis of the NPR inlet and outlet primary piping has been completed (HW-73446).

The criteria for hydrostatic testing of the erected primary loop, HW-71320, has been revised. It includes a list of valves which must be open during the tests, since these valves could be damaged by excessive differential pressures if they were closed.

A failure sequence review of primary coolant pressure, pressurizer level, and injection systems has been completed and a comment draft issued. The report describes the systems, the response characteristics of the instruments, assumes types of failures, analyzes sequential events, and describes procedures required to offset the effects of the assumed failures.

Conversion

A letter was forwarded to the Atomic Energy Commission reporting the results of a study of operating and maintenance cost increases and decreases that may be expected to result from conversion. In the order of nine operators would be required chiefly for shift coverage of added equipment in the Power House. There would be no change in the size or makeup of the planned maintenance force by reason of conversion. However, it is estimated that there would be reductions in overtime work that might approach, in terms of annual cost, the cost of supporting these additional operators. This reduction in the estimated maintenance overtime costs for NPR without conversion would be made possible by the existence of a second boiler and house generator, additional spare pumps and drives and additional isolating valves permitting more parts of the system to be maintained during the operation of the plant, and with the reactor operating at approximately its full power rating.

Project CAI-816Primary Coolant Pumps

The primary coolant pump which failed during a preliminary hot test on April 17, 1962, was reassembled with modifications and a preliminary hot test was run on June 5, 1962. The loop temperature was increased from ambient to about 600 F at an average rate of about 120 F per hour while the speed was increased from 500 rpm to 1800 rpm. After about 45 minutes operation at 600 F, the temperature was reduced to 200 F at about 120 F per hour. There were no indications of any troubles with the pump operation.

On June 27, 1962, a letter was forwarded to the Atomic Energy Commission, including the thermal transients that General Electric believes will be imposed on the primary coolant pumps. These thermal transients were based on pertinent design criteria, interpretation of analytical curves, and certain operating requirements.

Process Tube Diversion Valves

Intensive efforts have been initiated at Chandler-Evans to resolve the problem with variable piston ring leakage which results in erratic actuation of process tube diversion valves. The tests include two, three, and four ring concepts. A four groove piston with radially-loaded rings, .080" wide, flash chrome plated, and with side clearances between 0.3 and 0.8 mils, performed consistently and satisfactorily through five thermal and fifty valve cycles.

Horizontal Rod Drives

Assembling and testing of horizontal rod hydraulic cylinders by the subvendor, Cascade, has been resumed. Changes to the cylinder packing design, the packing tightening procedure, and the cylinder rod straightness inspection procedure were requested and have been approved.

Assembling and testing of horizontal rod drives has been resumed at the Rucker Plant in Oakland, California. The specification for allowable oil leakage during scram runs was relaxed and drip pans were added to the design to prevent oil from dripping on the rod.

Mixing Matrix

Revised Approved-for-Construction drawings showing the deletion of the matrix-type mixing header were received from Burns and Roe on June 19, 1962, and reviewed and accepted by General Electric on the same date.

Analog Simulation Studies

A letter was transmitted to Burns and Roe on June 8, 1962, that defines the analog simulation program required by General Electric to show acceptability of the heat dissipation system. Specific programs were outlined for (1) the secondary system simulation, (2) primary coolant pressure and level control simulation; and (3) primary loop flow control simulation.

F and R Elevators

On June 7, 1962, the Atomic Energy Commission suspended its approval of the F and R Elevators until further justification and funds become available. On June 14, 1962, information on the F and R Elevators, including the operational justification and design and project considerations, was forwarded to the Atomic Energy Commission.

Flow Monitor Power Supply

No bids were submitted by the ten vendors solicited to furnish the 420-cycle power supply for the flow monitor system. As a result of contacts with the vendors it has been determined that engineering cost, volume of business, and a very tight specification discouraged bidding.

General Electric engineers visited a number of firms to stimulate interest in the fabrication of this equipment and to obtain comments about the specification for consideration of changes. As a result of these contacts, seven firms expressed interest, no changes were made in the specification, and new bids have been solicited.

Instrumentation Installation Specification

All twenty-two sections of the Instrumentation Installation Specification have been issued, of which thirteen sections have been approved. The remaining nine are in "comment" status. Included in the subject matter are scope; applicable drawings, specifications, materials, and equipment; installation requirements; installation procedures; and testing requirements.

Flow Monitor Isolation

Bids were received on June 19, 1962, for prototype isolating transformers to isolate the flow data logger from the flow monitor. The low bidder was Peerless. An order was placed by telephone.

Temperature Detector

Eleven Engelhard clamp-on resistance temperature detector prototypes passed the response time test in the Schutte and Koerting hot loop.

Venturis

All top-of-ingot forgings (approximately 600) have been released for machining to venturi bodies as a result of magnetic particle testing of 50 forgings and removal of defect indications by filing. The outside surfaces of approximately 300 venturis have been machined.

Equipment Development and Testing

The Component Test Loop was used primarily to test the process tube inlet and process tube diversion valves mounted in the Full Scale Facility. Of particular importance, are the Actuator Timing Tests for the diversion valves and the Torque Tests for the inlet valves.

Testing of the confinement steam vent has been initiated. The backup closure bag has been successfully inflated, using air, nitrogen, and air and nitrogen. The controls inflate the bag in the required time and maintain pressure within design limits. Leakage around the bag is minor except at the bag seam. Work has been started to reduce leakage at the bag seam.

FIELD ENGINEERING OPERATIONConstructionGeneral

Teamster pickets were withdrawn at 2:30 PM, June 12, 1962, and approximately 85 per cent of Kaiser craftsmen personnel returned to work on June 13, 1962. All crafts are working for Kaiser Engineers; however, ironworkers are still on strike against the subcontractors.

105-N and 109-N Buildings

Work has now been resumed on most of the items which were in progress in the 105 Building when the strike started. This includes efforts on the installation of structural steel and liner plates on the thermo-barriers in the inlet and outlet pipe spaces. This work is being done by CPFF Kaiser Engineers' forces and ironworkers.

The subcontractors on the 105 Building are being partially handicapped by lack of ironworkers.

The Bay Company is now working on the punch list items for subcontract SC-71.

All of the exposed electrical conduit work in the 105-N Building included in subcontract SC-99 has now been completed and the subcontract acceptance forms for Lord Electric, the contractor, have been approved.

Work was started the week of June 18 on running eddy current tests on Inconel tubing stored in the warehouse. Approximately 2 per cent of this tubing has now been tested with about 4 per cent of the tubing tested to date indicating defects of a questionable or unsatisfactory condition. Eddy current testing of the Inconel tubing installed through the inner rod room walls has been completed. As a result, 4 of the 1162 tubes will be permanently abandoned. In addition, 12 tubes will be used as spares for future use only. There are 16 tubes which have I.D. restrictions to the extent that the eddy current probe would not pass through the tubes. There were also 4 tubes which already had connecting tubing attached to them and were, therefore, not tested.

Pile Erection

As of the end of June, 904 zirconium process tube assemblies had been installed. Tube installation was changed to a one-shift basis after the strike to allow time to reprocess scratched tubes and permit the delivery of the remaining nozzles. In an attempt to reautoclave tubes scratched after the inlet nozzle has been installed, a portable autoclave assembly has been designed and is now being tested. Autoclave time on tubes reconditioned on the O.D. surface has been reduced to 48 hours and on tube spot conditioned only on the O.D. surface to 24 hours. The O.D. film does not require the wear resistance characteristic of the I.D. film.

Administration

The following material has been issued during the period of May 21, 1962, through June 24, 1962:

Drawings	244
Criteria	4
Specifications	7
Requisitions	64
ATP's	14
Other	6
TOTAL	<u>339</u>

Reviews were completed and formal comments were offered on engineering material as follows:

Drawings	6
Specifications	2
Scope	0
ATP's	3
TOTAL	<u>11</u>

Bailey Meter material processed as of June 24, 1962, is as follows:

Released as Noted for Fabrication	
Drawings	94
Released for Information	47
Released for Fabrication Drawings	39
Not Released for Fabrication	
Drawings (B&R)	11
Approved Without Exceptions (GE)	5
Not Approved (GE)	2
TOTAL	<u>198</u>

PRIMARY LOOP ENGINEERING

One hundred seventy-five (175) pipe spools, weighing 97.9 tons, have now been shipped to the field. Shipments to HUICO from their suppliers now total 1097.9 tons, of which 484.7 tons represent high-pressure piping.

On June 27, 1962, the first spool of high-pressure fusion-welded pipe was shipped to the field.

Work activity in the HUICO shop has continued on an upward trend during the past month. Primary Pipe activity in the field started again on a limited basis on June 13, 1962.

The following is the status of primary pipe approval data as of the end of June 1962:

Total number received	2361*
Number approved	692
Number approved with exceptions	28
Number not approved	22
Number currently being reviewed	2
By GE and B&R jointly	2
By B&R (109-N)	0
Number received for information only -	1617
No approval required	

* Includes 1617 received for information only.

PROGRAM EVALUATIONDesign Status

	<u>Wt'd Total</u>	<u>Certified Schedule</u>	<u>Actual % Complete</u>
<u>Reactor Plant as of 7/1/62</u>			
<u>Title I</u>			
Scope		100	100 (1)
<u>Title II (2)</u>			
Drawings	60	95	95.6
Specifications	5	99.4	98.8
Requisitions	10	82.5	80.8
ATP's	10	55	57.9
Development and Testing	<u>15</u>	<u>95.5</u>	<u>95.7</u>
Total	100	90.7	90.6

Heat Dissipation Plant as of 7/1/62

<u>Title I</u>		
Scope	100	98.8
<u>Title II</u>		
Detail Design	100	95

	<u>Req'd</u>	<u>No. Issued to 6/26/62</u>	
		<u>Scheduled</u>	<u>Actual</u>
Preliminary Drawings (bid)	1130	1108	1014
Detail Drawings (for const.)	1130	1108	1108
Specifications (bid)	153	152	150
Requisitions	183	169	169
ATP's (preliminary)	13	3	3
(final)	13	1	1

<u>Composite Design Completion as of 7/1/62</u>		<u>Certified</u>	<u>Actual</u>
<u>(Reactor and Heat Dissipation Combined)</u>		<u>Schedule</u>	<u>% Complete</u>
Total		95.8	93.5

- (1) This percentage represents only the completion of 44 criteria and does not include updating or revising.
- (2) Weights and schedule revised 5/1/62 and submitted to AEC for approval.

Cost Estimate

No formal Washington approval has been received on the February 9, 1962 recommendation that the authorization be increased from \$145 million to \$182.6 million.

Schedules

On April 13, HOO-AEC submitted Revision # 4 to the Certified Construction Schedule to Washington for their consideration. This schedule shows construction completion October 1, 1963.

The construction status as of 7/1/62, based on the Revision # 4 to the AEC Construction Schedule, dated April 13, 1962, is as follows:

	<u>Scheduled</u>	<u>Actual</u>
Temporary Construction	78	74
General Area Systems	63	69
105-N Building	67	57
109-N Heat Exchanger Building	56	45
163N-183N Water Treatment Facilities	95	96
181-N River Water Pump House	98	99
182-N High Lift Pump House	96	91
184-N Standby Power House	94	89
153-N Switchgear Building	90	95
NPR Project (CAI-816)	66	58

Manager, NPR Project

JS McMahon:mf

DECLASSIFIED

HW-74101

SIGNIFICANT REPORTS ISSUED

<u>Number</u>	<u>Class'n.</u>	<u>Author</u>	<u>Date</u>	<u>Title</u>
HW-SA-2583 (Thesis)	Unclass.	GT Haugland	5/10/62	A Study of Properties Related to Feasibility of Using Boron Steel for Nuclear Reactor Thermal Shielding
--	Unclass.	EM Kratz	5/31/62	WPPSS NPR Conversion Proposal Information Furnished at the Request of the Atomic Energy Commission
HW-73955	Secret	DL Condotta	6/11/62	Reactor Design Analysis - Monthly Report, May 1962
HW-74055	Unclass.	CL Goss	6/22/62	On the Solution of a System of K Independent Linear Non-Homogeneous Second Order Ordinary Differential Equations
HW-73446	Conf.	FJ Mollerus	6/29/62	NPR Primary Piping Fatigue Analysis
HW-74046	Secret	CE Bowers	6/19/62	Effect of C and K Control Capacity of VSR Liners
HW-72654 PT 3	Secret	CD Wilkinson	6/8/62	NPR Moderator Stack Purity Tests - Description, Analysis, and Results
HW-73615 Supp. 1	Secret	RD Carter	6/4/62	Addendum on Corrosion Aspects, E-N Demonstration Loading
HW-73860	Unclass.	NF Fifer	5/31/62	Design Test 1138 - 105-C Replacement Outlet Connector Tests
HW-73871	Secret	NF Fifer	6/1/62	Reactor Modification Program Estimated Reactor Outage and Expenditure Program
HW-73941	Unclass.	MH Schack	6/6/62	Design Test No. 1139 - 105-K Inlet Nozzle Strength Test - 105-K Zirconium Tube
HW-73778	Secret	FC Kempf RS Hammond	5/28/62	Graphite Distortion Problem Program

Number	Class'n.	Author	Date	Title
HW-74079	Unclass.	JW Ballowe	6/25/62	Design Test 1140, K Reactor Gunbarrel Groove and Retaining Ring Test
HW-72996	Unclass.	RT Jessen	3/14/62	1706-KER Piping Code Compliance and Variances
HW-69510 Supp. 1	Unclass.	WEB Lander	5/23/62	Design Test 1075 - NPR Water Sample Flow Regulator Test Report Supplement
HW-73229	Secret	FE Haun, Jr.	6/1/62	Flow Testing Rear Face Hardware Combinations
HW-73773	Unclass.	MJ Vea	6/1/62	Design Test 1067 - Performance Test of Faulted Trims - NPR Dump Valve Evaluation
HW-74017	Unclass.	RL Woodward	6/15/62	Nozzle - Van Stone Flange Gasket Test Report
HW-73892	Unclass.	HC Copeland	2/21/62	Remote Operation - 115 Bldgs., D/DR, B/C, and H Feasibility Report
HW-73920	Unclass.	JL Deichman	6/8/62	Comment Issue - Conceptual Study Report, Intermediate Range (Nuclear) Monitoring
HW-73081	Unclass.	OR Lingmann	3/15/62	A Radiation Monitoring Telemetry System for Personnel
HWS-5994	Unclass.	RR Henderson	5/15/62	Procurement Specification for Resistance Temperature Detector-to-Cable Assemblies - All 105 Buildings
HW-73950	Unclass.	HF Jensen	6/6/62	Reclaiming and Improving of Resistant Temperature Detector Instrumentation in the Reactor Zone Temperature Monitoring System
HW-74501	Unclass.	GF Howden	6/18/62	In-Pile Force Measurement, Channel Resizing Procedure - Channel 47 - 105-C
HW-73770	Unclass.	DB Lovett	5/28/62	Insulation Resistance and Moisture Penetration in Sheathed Mineral Oxide Insulated Cables

DECLASSIFIED

HW-74101
DECLASSIFIED

Number	Class'n.	Author	Date	Title
HW-73746	Unclass.	GL Erickson	5/24/62	Rupture Confirmation Instrumentation Development Report
HW-73694	Unclass.	R Sherrard	5/23/62	Interim Report, Examination of ZTM Systems Prior to Incorporation in the Safety Circuit
HW-73378	Secret	RS Hammond FJ Kempf	5/28/62	Graphite Distortion Problem Program
HW-73874	Secret	LR Kelley	6/4/62	Tests, Cavitation Induced Erosion and Vibration on the K Reactor Nozzles and Pigtails
HW-73973	Unclass.	VS Blanchette	6/6/62	DT IP-511-E Voltage Recording Tests - 105-F
HW-71127 Supp. 1	Unclass.	PH Hutton FW Van Wormer	6/5/62	PT IP-441-AE, Sup. 1, Installation of Modified Rear Cross-header, DR Reactor
HW-72044	Unclass.	PH Hutton	6/13/62	Design Change No. 527 - Alt.2- Installation of 5/8 Inch Inconel Connectors - 105-C Front Face
HW-74179	Official Use Only	PC Jerman		IPD Investigation Report of Radiation in Excess of Operational Controls
HW-74180	" "	"		
HW-73643	Unclass.	RM DuPerre	5/15/62	Truarc Retaining Ring Failure Investigation
HW-73858	Unclass.	JR Young	6/1/62	Quarterly Report - The Reactor Process Tube Problem
HW-73953	Conf.	JR Young	6/11/62	100-K Reactor Fringe Tube Thickness and Corrosion Rates
HW-73987	Conf.	CR Barker	6/13/62	DT-IP-507 Nozzle Cap Compression O-Ring Seal for Six Old Reactors

TRIPS

Name	Firm & Location	Date	Purpose
E Hollister	Sintercast W. Nyack, New York	6/4/62	To discuss fabrication problems of titanium, sintered aluminum and B ₄ C for use in replacement HCR's.
	General Astrometals, Yonkers, New York	6/5/62	" "
	Metal Power Ind. Federation, New York City	6/6/62	" "
	Titanium Metals Co. New York, N. Y.	6/6/62	" "
	Reactive Metals Niles, Ohio	6/7/62	" "
	Republic Steel Massilon, Ohio	6/8/62	" "
MH Schack	ASME Annual Mtg. Quebec, Canada	6/10-11/62	Regional Delegate to ASME Annual Meeting
	Gougler Machine Co. Kent, Ohio	6/13-15/62	To review vendor program on prototype nozzles for K Reactor zirconium retubing program
HF Jensen	Materials Symposium Waterford Silicone Plant Schenectady, New York	5/22-28/62	Inspection of the facilities
JH Hoage	Dow Metal Products Madison, Illinois	6/4-7/62	Metallurgical consultation with vendors of poison splines
	ALCOA New Kensington, Pa.		" "
	Sintercast West Nyack, N. Y.		" "
	General Astrometals Yonkers, N. Y.		" "
JC Baudendistel	Montana-Dakota Utilities Company Sheridan, Wyoming	6/18-22/62	To observe testing of boiler operation and obtain information useful in establishing our proposed boiler operation criteria

DECLASSIFIED

HW-74101

<u>Name</u>	<u>Firm & Location</u>	<u>Date</u>	<u>Purpose</u>
OH Greager	New York, N. Y.	6/10-16/62	Attend GETHC Meeting
GC Fullmer	New York, N. Y.	6/11-15/62	Make Presentations at GETHC
R Nilson		6/12-16/62	Meeting
WS Nechodom		"	
RE Trumble	New York, N. Y.	6/11-22/62	Make presentation at GETHC Meeting
	Boston, Mass.		Attend ANS Meeting
SS Jones	Washington State Univ. Pullman, Wash.	6/14-15/62	Assist in analyzer studies
WL Stiede	Atomic Power Develop- ment Associates Detroit, Michigan	6/14-17/62	Discussions on instrumentation and control
	University of Mich. Ann Arbor, Michigan	6/18-27/62	Short course on automatic control
JS Hagan	Boston, Mass.	6/16-29/62	Attend ANS Meeting
GF Owsley		6/15-28/62	
	MIT-Cambridge, Mass.		Discussions on instrumentation and control
	KAPL-Schenectady, N. Y.		" "
	BNL-Upton, L.I., N. Y.		" "
SM Graves	Boston, Mass.	6/16-22/62	Attend ANS Meeting
	GE Turbine, Generator, & Gear Department West Lynn, Mass.		Discuss quality control pro- cedures and apprentice training program
ML Smith	Boston, Mass.	6/18-21/62	Attend ANS Meeting
CE Bonham	Gray Tool Company, & Texas Bolt Company Houston, Texas	5/28/62	Review fabrication and material requirements of studs for NPR couplings
EM Kratz	Byron Jackson Pump Co. Los Angeles, California	6/3-7/62	Witness preliminary hot pump test
DD Stepnewski	New York, N. Y.	6/5-6/62	Attend Nuclear Congress
	General Electric Co. Schenectady, N. Y.	6/7-8/62	Deliver paper and attend Two Phase Fluid Flow Symposium

Name	Firm & Location	Date	Purpose
A McDonald	Westinghouse Corp. Portland, Oregon	6/18-22/62	To observe condition of failed water
	Montana-Dakota Utility Co., Sheridan, Wyoming		To review and evaluate maintenance of steam turbines and auxiliary pump equipment
	Westinghouse Corp. Portland, Oregon	6/27-28/62	To review results of Westinghouse Service Shop investigation of failed low-lift motor from 190-K
RG Knirck	W. A. Kates Co. Deerfield, Illinois	5/31- 6/1/62	To review flow regulator problems with vendor
FJ Mollerus	AIEE General Meeting Denver, Colorado	6/17-21/62	Attend annual meeting of AIEE District Secretaries, attend technical sessions, formulate plans for April 1963 Richland Technical Conference
JM Fox, Jr.	Gray Tool Co. Houston, Texas	5/28/62	NPR connectors
RW Pitman	Seattle, Wash.	5/30- 6/2/62	Attend AWWA Meeting
	Northwest Filter Co. Seattle, Wash.		Discuss portable filters
EC Bennett	Savannah River Plant Aiken, S. Carolina	6/2-9/62	Discuss fuel element examinations and test loop operation
	Miami, Florida		Presented paper at ASME Lube Conference
SS Jones	GE-General Engrg. Lab. Schenectady, N. Y.	6/7-10/62	Attend Two-Phase Flow Symposium; consult with GEL on flow problems
DH Curtiss	Wolverine Tube Co. Detroit, Mich. & Decatur, Ala.	6/10-15/62	Consultations on zirconium tube contracts
	Tube Reducing Corp. Wallington, N. J.		" "
WP Howell	Chicago, Ill.	6/10-16/62	Attend Health Physics Soc. Mtg.
	Savannah River Plant Aiken, S. Carolina		Discuss radiation protection training

DECLASSIFIED

EW-7-101

<u>Name</u>	<u>Firm & Location</u>	<u>Date</u>	<u>Purpose</u>
GA Newell	Cascade Manufacturing Co., Portland, Oregon	6/6/62	Discuss design and fabrication problems with horizontal rod hydraulic cylinder.
JD McCullough	Hoke, Incorporated Cresskill, New Jersey	6/10/62	Witness tests on valve for rupture monitor valve rack
	Avien, Incorporated Woodside, New York	6/11-12/62	Engineering related to flow monitor system
	Bogue Electric Mfg. Co. Patterson, New Jersey	6/13/62	Technical discussion on 420-cycle power supply
	Kearfott Div., General Precision, Inc., Little Falls, New Jersey	6/13/62	" "
	Louis Allis Company Milwaukee, Wisconsin	6/14/62	" "
	Electric Machinery Mfg. Co., Minneapolis, Minn.	6/15/62	" "
RA Rohrbacher	Heath Plating, Inc. Kent, Washington	6/12/62	Discuss plating procedures problems associated with RTD cable plating
J Muracka	Univ. of Washington Seattle, Washington	6/14/62	Attend Heat Transfer and Fluid Mechanics Institute
LP Reinig	AIEE Summer General Mtg. Denver, Colorado	6/17-20/62	Attend AIEE Section Chairman's Meeting
	Chandler-Evans Hartford, Connecticut	6/21-22/62	Discuss NPR diversion valve production problems.
WJ Dowis	AIEE Summer General Mtg. Denver Colorado	6/20-22/62	Attend AIEE meeting
WJ Dowis JS McMahon	APED, San Jose, Calif.	6/29/62	Discussions on advanced reactor study
DL Condotta WJ Mundt JS McMahon	Burns and Roe, Inc. Hempstead, New York	6/25-27/62	Attend meeting to coordinate design activities on NPR
CE Love	Wolverine Tube Co. Detroit, Michigan and Decatur, Alabama	6/11-12/62	Review fabricating facilities for K process tubes

Name	Firm & Location	Date	Purpose
GL Gray	Instrument Systems, Inc Los Angeles, California	6/18-21/62	Witness equipment check-out
CD Shadlinger	Ladish Company Cudahy, Wisconsin	Throughout Month	To provide technical liaison to NPR piping vendor
	Taylor Forge and Pipe Works Cicero, Illinois		" "
WW McIntosh	Ladish Company Cudahy, Wisconsin	6/21-22/62	To discuss expediting of primary loop piping.
WJ Love	ANS-7 Subcommittee Mtg. Boston, Mass.	6/18-20/62	Attend ANS-7 Subcommittee Meeting
	GEL, General Electric Co. Schenectady, New York	6/21/62	Discuss control rod seals.
SL Nelson	American Nuclear Society Boston, Mass.	6/17-21/62	Presented a paper entitled "Conservation of Helium by Means of Radioactive Argon Measurements"
MP Johnson	Montana-Dakota Utilities Generating Station Sheridan, Wyoming	6/18-23/62	Observed boiler accelera- tion tests
JH Soehnlein	Health Physics Society Chicago, Illinois	6/11-15/62	Attend annual meeting
FC Meckle	Kinkade Machine & Tool Portland, Oregon	6/20/62	Discuss vendor contact specifications
RH Wheaton CT Hayner	Boeing Aircraft	5/28/62	Discuss Recordac equipment and the use of vendor informa- tion service microfilm files
CT Hayner	American Nuclear Congress New York City, N. Y.	6/4-8/62	Attend meeting
JW Green	Kates Regulator Co. Highland Park, Ill.	5/30- 6/2/62	Discuss fabrication of flow regulator valves
RD Duncan	Univ. of Wash. Seattle, Wash.	6/18-19/62	Attended a course on ventilation
	Precision Products Co. Seattle, Wash.		Discuss grit blasting equipment

RECEIVED
JUN 21 1962

DECLASSIFIEDVISITORS

<u>Name</u>	<u>Firm & Location</u>	<u>Date</u>	<u>Purpose</u>
JG Schneeman	X-Ray Products Corp. Pico-Rivera, California	6/4-8/62	Consultations on NPR primary piping
RC Thorburn	GE-APED	5/31-	Discuss process standards
WN Lorentz	San Jose, California	6/1/62	preparation and administration
D Drew	Beckman Instrument Co. Bellevue, Washington	6/13/62	To work on oxygen analyzer
VN Lawford	Barton Instrument Co. Monterey Park, Calif.	6/13-15/62	Review calibration work on Barton differential pressure transducers for NPR
J Payne	Atomic International	6/4/62	Scintillation type spectro-
H Mandel	Canoga Park, Calif.		meters and isotope (O_{18} and N_{16}) analysis. Fuel rupture monitoring
W Reed	Consultant Los Angeles, Calif.	6/11-16/62	To provide consultation on boiler operation and 184-H acceleration testing
WA Sommers	Panellit, Inc. Skokie, Ill.	6/12-13/62	To inspect sticking-to-stop problem of system meter relays
R Day	Byron-Jackson Co. Los Angeles, Calif.	6/12-29/62	To work on KER primary coolant pumps
J Bottmer	General Motors Co. Seattle, Washington	6/18-29/62	To assist in performing ATP's on 3 diesel driven pump units, 182-K Building
F Drayos	Byron-Jackson Co. Los Angeles, Calif.	6/20-21/62	To inspect KER recirculating pump No. 2
PA Dahlen	E.I. duPont Co.	6/20-21/62	Discuss maintenance practices
AJ Schwertsfeger	Savannah River Plant		& standards and training programs
RC Thorburn	GE - APED	6/1/62	Discuss service manuals,
WM Lorentz	San Jose, Calif.		maintenance standards & crafts training.

END

**DATE
FILMED**

2 / 12 / 93