[REDACTED]

HW--79070

DE93 003961

DECLASSIFIED

IRRADIATION PROCESSING DEPARTMENT

MONTHLY REPORT

SEPTEMBER 1963

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

MASTER

DECLASSIFIED

[REDACTED]

[REDACTED]

DISTRIBUTION RESTRICTED TO U.S. ONLY

DECLASSIFIED

HW-79070

This document consists of
pages. ~~No. 1 of 1~~
~~22 copies. Series A.~~

IRRADIATION PROCESSING DEPARTMENT
MONTHLY REPORT
SEPTEMBER, 1963

HANFORD
86470

Compiled By
IPD Personnel
October 14, 1963

Classification Cancelled (Change to
DECLASSIFIED)

RICHLAND, WASHINGTON

By Authority of PR-24
DS Lewis 8/25/92
DS Richman 10/13/92
PM Eick 10-13-92

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

[REDACTED]

Route To:	P.R. No.	Location	Files Route Date	Signature and Date

GROUP I
Excluded from automatic downgrading
and declassification.

DECLASSIFIED

DECLASSIFIED

HW-79070

DISTRIBUTION

Copy Number

1	W. E. Johnson
2	A. B. Greninger
3	H. M. Parker
4	APD, F. E. Crever
5-6-7-8-9	RLOO-AEC, J. E. Travis
10-11-12	AEC Production Division, F. P. Baranowski
13	SROO-AEC, R. C. Blair
14	R. L. Dickeman
15	O. H. Greager
16	R. T. Jessen
17	O. C. Schroeder
18	O. P. Amacker
19	W. N. Mobley
20	R. W. McMichael
21	300 Area Files
22	Records Center

TABLE OF CONTENTS

<u>SUMMARY</u>	A-1
<u>MANUFACTURING</u>	
Production Operation	B-1
Reactor Operation Statistics	B-2
Reactor Operations	B-3
Applied Reactor Engineering	B-6
<u>PRODUCTION FUELS</u>	
AlSi Shop	C-1
Materials	C-2
Fuels Engineering	C-3
Plant Facilities	C-8
<u>RESEARCH AND ENGINEERING</u>	
Process and Reactor Development	D-1
Process Technology	D-7
Operational Physics	D-12
Testing	D-17
<u>FACILITIES ENGINEERING</u>	
Design Engineering	E-1
Equipment Development	E-4
Project Engineering	E-6
<u>FINANCIAL</u>	F-1
<u>REPORTS, TRIPS AND VISITORS</u>	G-1

DECLASSIFIED

~~DECLASSIFIED~~

HW-79070

SUMMARY

MANUFACTURING

Reactor MWD input production for September was 2.9% below forecast: 6.5% above at the smaller reactors and 12.8% below at the K's. Production for the third calendar quarter was 4.8% above forecast.

Over-all time operated efficiency for September was 75.2% (77.8% forecast): 75.8% at the smaller reactors and 73.6% at the K's. The low efficiency at the K's (15.5% below their forecast) resulted largely from a tube outage and four unscheduled outages at KE Reactor. The KW Reactor experienced a 100% time operated efficiency for the month.

No new power level or production records were established during September.

Five I&E fuel element failures were removed from the reactors: four natural metal and one enriched. Two of the natural failures were at D, one at B and one at KE. The enriched rupture, at C Reactor, failed at 42% of goal exposure because of mechanical damage. None of these ruptures were caused by the unclassified plutonium program.

The fourth E-N core at H Reactor was discharged at an average concentration of 1089 MWD/T vs. the usual enriched metal goal exposure of 900 MWD/T for this reactor. No ruptures were experienced during the irradiation of the load. The last enriched metal rupture in the E-N loading was during March, when the third core had reached a concentration of 578 MWD/T.

Four internal and four rear Van Stone leaks were corrected. A total of 722 new process tubes, including 597 zirconium, was installed.

PRODUCTION FUELS

A total of 529 tons of natural and enriched fuels was produced during September, 109% of forecast.

Canning line operation continued throughout the month at the rate of eight lines per day. The forecasted total of 160 canning line shifts for the month was reduced to 157.7 shifts as a result of plant downtime scheduled to permit employees to attend the N Reactor dedication ceremony by President J. F. Kennedy.

Canning line efficiency was 99.2% for the month.

Bare core inventory at month's end was 1705 tons, a 3.0 months' supply, including 105 tons of dingot cores.

Finished fuel inventory at month's end was 1395 tons, a 2.6 months' supply, including 139 tons of dingot fuels.

The amount of work in process has been reduced substantially during the month. All of the fuel needing resizing of rail supports has been completed and returned to storage or Reactor areas. With plant input and output substantially above forecast, in-process backlogs have been reduced and production is moving through the plant at stable rates.

Manufacturing yields continued to improve during September. A new record high yield for six-inch nonprojection fuels was established during the month.

The elliptical welder was out of service most of the month because of difficulty in meeting specifications on rail tip clearance. An equipment capability test was conducted and discussions are under way with reactor representatives to establish new specifications within the capability of the equipment.

The self-support welders have been operating satisfactorily all month with throughput rates averaging above 600 and reject rates as low as one per cent on certain days.

Seven 10-inch-long enriched fuel elements were successfully canned in the Pilot Plant using two 5.179-inch cores per fuel element. The elements were assembled with no difficulty and experienced no nondestructive testing problems.

Three special thorium target elements and 100 charges of prototype lithium-aluminum target elements were fabricated and charged during the month.

The evaluation of the enriched production test fuel elements fabricated by the hot die sizing process has been completed. The fuel elements proved to be of reactor grade quality and in some quality attributes superior to any previously produced.

RESEARCH AND ENGINEERING

Power levels at all reactors were restricted by the 95 C bulk outlet water temperature limit.

An interim discharge of two columns of the test loading of hot-die-sized diffusion-bonded fuel was made at 380 MWD/T. Visual examination of these elements and the companion Al-Si bonded elements revealed no evidence of abnormal corrosion. The remainder of the test is scheduled for discharge at 800 MWD/T exposure.

Long-term reactivity gains at B Reactor, due to its operation in accordance with a high-temperature-graphite production test, have occurred faster than expected. F Reactor, which is now on the same test, is adjusting the increase in CO₂ with the B Reactor experience as a guide.

Operation of the 1706-KER recirculation loop facility in support of NPR fuel development has continued. Loop KER-1 is charged with stainless steel clad fuel for use as crud detectors and enriched N inner fuel pieces for

DECLASSIFIED

DECLASSIFIED

HW-79070

further evaluation of the effect of using ammonium-hydroxide for coolant pH control. The irradiation to evaluate target element swelling characteristics and tritium migration in KER-2 continued. The regular N fuel assemblies in Loops KER-3 and KER-4 have reached 1020 MWD/T and 650 MWD/T, respectively, against a goal of 2100 MWD/T.

FACILITIES ENGINEERING

Following the zirconium tube installation outage at KE Reactor, a total of 834 zirconium process tubes was successfully charged with self-supported fuel utilizing the Mark I and Mark II Union Machine Works charging machines. Of the 834 tubes, 238 contained goal exposed self-supported fuel elements. The 596 empty tubes were charged at an average rate of 35 tubes per hour, although minor mechanical deficiencies on the Mark II prototype charging machine interfered with the progress of the work.

The Mark II prototype linear rate-of-rise instrumentation has completed 5500 hours of continuous operation with no component failures or degradation of performance. Selection of dual indicating meters required by the system continues to be a problem, but, with this exception, development is considered complete.

Approval has been received from RLOO-AEC for the performance of a study of the feasibility of electrical power recovery from the existing Hanford reactors. The planned study program will require the remainder of the fiscal year for completion at an estimated cost of \$120,000. This study will be based upon making full utilization of available reactor technology, including that developed by the NPR program, and exploiting the capabilities of the existing reactors through the utilization of the demonstrated reactor overboring techniques.

Technical and contractual discussions, relating to High Speed Scanning equipment procurement, were held with Astrodata, Inc. representatives. They were requested to provide a formal proposal by October 3.

The second major outage for installation of zirconium tubes on the KE Reactor was completed on September 7 with the installation of 597 tubes for a total of 1165 zirconium tubes installed in this reactor to date.

RESPONSIBILITY

There were no significant changes in responsibilities.

CONFIDENTIAL

HW-79070

FORCE SUMMARY

	<u>Exempt</u>	<u>Non-Exempt</u>	<u>Total</u>
General	7	2	9
Research and Engineering	90	57	147
Manufacturing	401	1389*	1790
Production Fuels	106	403	509
Facilities Engineering	89	34	123
Financial	20	14	34
TOTAL	713	1899	2612

*Includes 10 N Reactor replacement trainees.

SAFETY, SECURITY AND RADIATION EXPERIENCE

There were 126 medical treatment injuries, one security violation, no disabling injuries or radiation exposures exceeding operational control.

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. 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.

General Manager

AB Greninger:DLD:bm

DECLASSIFIED

DECLASSIFIED

HW-79070

MANUFACTURING

PRODUCTION OPERATION

There were no discharge goal exposure plan changes initiated during September. The exposure of material discharged exceeded the record set in July, 1963 by 1.5% due primarily to the unusually high exposure reached in the H Reactor E-N core loading. This material is the first enriched uranium available in large enough quantity and high enough exposure to permit diversion to the unclassified plutonium program.

SEPTEMBER DISCHARGE EXPOSURE (MWD/T)

<u>Regular Uranium</u>		<u>Enriched Uranium</u>	
<u>Smaller</u>	<u>K's</u>	<u>Smaller</u>	<u>K's</u>
748	684	1053	856

Rail and truck shipments of Essential Materials were as follows:

Carload shipments for IPD	-	289
Carload shipments for other Depts.	-	106
Truck shipments for IPD	-	<u>104</u>

499

An annual Essential Material saving in excess of \$150,000 is expected from the lowering of reactor coolant water sodium dichromate feed from 1.9 ± 0.1 to 1.5 ± 0.1 . This change was made, at all reactors except C, in accordance with PITA-IP-25-A. The C Reactor is continuing on a half-plant low dichromate test, initiated March 1, 1963, to determine if further reduction is feasible.

CONFIDENTIAL

HW-79070

MONTH	REACTOR OPERATION STATISTICS - PROCESSING									
	B	C	D	DR	F	H	KE	KW	TOTAL	
SEPTEMBER, 1963										
INPUT PU (% OF FORECAST)	180.7	76.0	108.6	117.4	93.5	90.3	55.2	115.1	97.1	
TIME OPER. EFF. (% OVERALL)	88.7	61.6	82.3	91.0	72.8	58.3	47.2	100.0	75.2	
NEW TUBES INSTALLED	0	20	6	1	3	73	619	0	722	
WATER LEAKS - TUBE	0	0	0	1	1	2	0	0	4	
- VAN STONE	0	0	1	0	3	0	0	0	4	
FUEL ELEMENT RUPTURE	1	1	2	0	0	0	1	0	5	
HELIUM CONSUMED - M CU. FT.	54.0	511.5	270.6	156.0	578.4	281.4	136.3	127.9	2116.1	
UTILIZATION OF REACTOR OUTAGE HOURS										
CHARGE - DISCHARGE	32.5	42.1	38.7		44.6	117.2	80.7		355.8 6.2	
RUPTURE REMOVAL	25.2	4.0	4.3				24.6		58.1 1.0	
WATER LEAK		15.2	14.9	50.3	57.7	29.6	47.5		215.2 3.7	
TUBE REPLACEMENT	10.0	45.2	15.3		5.7	103.6	168.5		348.3 6.1	
MAINTENANCE	2.8	127.0	30.0	14.8	74.5	25.1	18.7		292.9 5.1	
STANDARD CHECK		15.3	1.6		4.5	4.4			25.8 0.4	
PRODUCTION TEST	1.0	26.7	22.7		7.2	6.0	2.6		66.2 1.2	
PROJECT WORK										
OTHER	10.2	1.1			1.8	14.4	37.3		64.8 1.1	
TOTAL	81.7	276.6	127.5	65.1	196.0	300.3	379.9		1427.1 24.8	
REACTOR OPERATION STATISTICS - POWER										
RIVER WATER PUMPED - M GALS.	8461.0		7111.9		3398.2	2545.0	4684.1	9567.8	35768.0	
WATER TREATED - M GALS.	3290.1	4339.4	4152.4	2836.3	3347.1	2449.9	4649.6	9567.8	34632.7	
WATER TO REACTOR - GPM NOR.	89800	100000	87700	87500	88800	82200	205800	209300	951100	
FINISHED WATER - ANALYTICAL DATA										
TURBIDITY PPM AVG.	.005	.005	.004	.003	.005	.002	.005	.005		
PH AVG.	6.6	6.7	6.6	6.6	6.6	6.6	6.6	6.6		
CL ₂ RESIDUAL PPM AVG.	.05	.05	.05	.05	.05	.14	.19	.25		
DICHROMATE PPM AVG.	1.59	1.38	1.55	1.55	1.49	1.73	0.41	1.49		
STEAM GENERATED M LBS.	62166		57535		29410	32105	17720	22950		
EVAPORATION RATE/LB. OF COAL	9.17		8.66		8.98	8.70	103.0	103.2		
EVAPORATION RATE/GAL. OF OIL							1142400	1501200	2643600	
TOTAL KW - HR GENERATED										

DECLASSIFIED

DECLASSIFIED

HW-79070

B-C REACTOR OPERATION

B Reactor experienced one outage caused by a ruptured fuel element at 79% of goal exposure. This was the first rupture of Dingot metal under the present program.

C Reactor experienced four outages: a continuation of the August 31 water leak outage, one manual trip (0.3 hour) to correct a front face water leak, one shutdown because of a ruptured enriched fuel element, and a scheduled outage for rear face bellows foaming and process tube replacement.

Hardness tests were made on all HCR's at B Reactor. A bulge similar to the one that required replacement of No. 2 HCR was observed on No. 8 HCR. The rod was replaced.

At C Reactor, installation of a "C" size flexible rod in VSR channel No. 48 resulted in an average rod drop time of 1.77 seconds for 90% insertion. Presently, VSR No. 41 is the only rod which does not fulfill the vertical rod drop time criteria.

One month's irradiation of graphite samples at B Reactor showed a maximum burn-out rate of less than 0.5% per 1,000 operating days. These preliminary results indicate that the high graphite temperature Production Test has had no deleterious effect.

At C Reactor, 184 rear face bellows were foamed through the can and 172 through the jack-bolt hole. The majority of the repairs was made above row 32. First indications are that helium consumption has decreased 30%.

The river elevation during the month varied from 384.5 to 407.2 feet. Low river flows coupled with high building temperatures resulted in river pumps 6C and 12C tripping-out on overload on September 10, 11, and 12.

Two rows of front-adjust Panellit gauges were installed at B Reactor; 26 rows have been installed to date.

At Building 184, the No. 3 boiler was placed in service and No. 1 removed for inspection and overhaul. No. 1 boiler was found to be in good condition by a representative of the Travelers Insurance Company.

D-DR REACTOR OPERATION

D Reactor experienced two outages caused by fuel element failures. A Panellit gauge scram caused the only DR Reactor outage during the month. The pressure fluctuation was caused by foreign material in a process tube orifice screen. During this outage a leaking process tube was located as the source of water leak indications prior to the shutdown.

Unexplained film build-up, in DR Reactor process tubes from September 6 to September 9, necessitated a slight reduction in reactor power level until the film was reduced to normal by a solids purge. Failure of high voltage

DECLASSIFIED

equipment supplying the iodine monitoring system caused activation of the D Reactor rear face fog spray system on September 30. An electrical power surge in the BPA system caused a momentary drop of three pounds in D Reactor process water pressure on September 9. No other effects were noted.

The installation of rear Van Stone flange seal inserts in DR Reactor process tubes was completed. A program to upgrade D Reactor front face nozzle caps was completed. All caps now have detents and are coated with corrosion resistant paint; caps were also inspected for incipient failure.

F REACTOR OPERATION

Production was limited by four outages: an unexplained Panellit trip, an internal tube leak, the inadvertent deactivation of the direct current to a 4500 HP motor, and a scheduled outage for charge-discharge.

One hundred and thirty-four tubes were measured for wall thickness and only two were found sufficiently corroded to warrant short charging pending replacement during the next tube outage.

The half-plant low alum test (PT-IP-549-A) continued with a minimum feed of 6 ppm except for a four-day period of 7 ppm and a one-day period of 8 ppm.

The 190 Building tank room air receivers and the 184 Building No. 4 boiler were inspected by third parties during the month.

Addition of 140 tons of filter media to restore the 183 Building filters to proper levels was started September 24. Work on nine of the 12 filters is complete.

The treatment of 184 Building boilers and area steam lines with a corrosion inhibitor started September 20 on a trial basis for a period of approximately six months. The inhibitor is added to boiler feed water with the normal sodium sulphite feed.

Major maintenance activities supporting Processing Operation needs included the following: replaced three process tubes, installed new boots on loop header tubes Nos. 69 and 80, foamed loop header bellows on rows 80, 81, and 82, cleaned the screens on the near high tank and on the near and far cross-headers, installed a mechanical vibrator on the pick-up chute, and installed 13 special thermocouples on the risers to measure temperatures at various riser locations. Water plant activities included overhauling a turbine, the No. 2 emergency pump, an air compressor, and the No. 1 boiler.

H REACTOR OPERATION

Reactor outage causes were: a process tube leak, a spline seal failure (scram), and a scheduled extended outage for metal processing and tube replacement.

DECLASSIFIED

DECLASSIFIED

HW-79070

In addition to the tube leak that caused the outage, a second leak was detected during the routine pre-start-up check of the extended outage. Both tubes were replaced. Seventy other tubes were replaced as potential problems because of corrosion, age and damage indications. All channels were broached rather than bored for the tube replacement effort with good results.

During metal discharge, 26 charges required greater-than-normal forces for movement. Of these, five process tubes were replaced because of damage potential.

The rear crossheader flow connector fittings of 138 tubes were reamed to improve coolant water flow. A return to normal flow was achieved on half of the tubes and a minimum of one gpm improvement was made on all but a few of the remaining tubes, which were considered statistical exceptions.

Use of a helium leak detector of greater sensitivity and background discrimination enabled the location of helium leaks that prior efforts could not clearly identify. Thirteen rear face gunbarrel bellows were sealed. Unicellular foam kits of larger volume were used with good results.

To achieve the necessary reduction of radiation levels at the beginning of the extended outage, two internal decontamination efforts were made on the rear crossheaders and associated hardware.

KE-KW REACTOR OPERATION

In addition to continuation of the tube replacement outage in progress at the beginning of the month, KE Reactor experienced four outages. Causes were a reactivity control situation, a Panellit trip, a fuel element failure and a suspected water leak. A total of 619 process tubes (597 zirconium, 22 aluminum) was installed during the extended outage.

There were no outages at KW Reactor.

The ethylene glycol heating system was placed in service. The stand-by steam glycol heat exchanger and boilers will be used to provide heat pending the planned installation of new heat exchangers which have arrived on site.

Installation of a direct current manual transfer switch on the emergency diesel control circuit at 182-K (Design Change 711) was completed. The modification will provide an improved procedure by eliminating the need to interrupt permanent electrical connections.

The Panellit gauge change-out program (Design Change 611) was continued with installation at KE Reactor of 230 reworked gauges having Delrin bushings and stainless steel pivots. To date a total of 359 and 463 gauges has been installed at KE and KW Reactors, respectively.

BFB

100-1030

HW-79070

APPLIED REACTOR ENGINEERING

MAINTENANCE PRACTICES ENGINEERING

Smaller Reactor Process Tubes

Based on the forecasted tube replacement rate projected by Plant Equipment Engineering, orders for replacement tubes for the smaller reactors will be deferred until at least July, 1964.

Vertical Safety Rods

The initial delivery date for 11 vertical safety rods is not being met. It now appears that only two rods will be shipped on October 1, 1963.

Horizontal Control Rods

The current status of spare parts rods on hand is as follows:

<u>No. of Rods</u>	<u>Type</u>	<u>Location</u>	<u>Remarks</u>
2	Full	Spare Parts	---
1	Full	103-B	---
1	Half	H	---
1	Half	190-F	Not field checked; may be full rod.
1	Half	J. A. Jones	Ready for delivery.
1	Half	J. A. Jones	Still being fabricated.

Rigid spare parts control is being maintained on these rods to assure maximum utilization before the new order of sixteen rods arrives.

Equipment Maintenance Standards

A policy change, in which maintenance service procedures are being excluded from Equipment Maintenance Standards, has reduced the work load. The current status is as follows:

a. In first draft status	-	77
b. Waiting for Multilith typing	-	0
c. Out for plant comment	-	0
d. Back from plant comment	-	0
e. Being routed for approval signature	-	37
f. Issued to date	-	<u>52</u>

Total 166

Inside Diameter of Zirconium Process Tubes

A gauge, using a metered air blow-by principle, is currently being used for measuring inside diameters of installed zirconium process tubes. With

DECLASSIFIED

DECLASSIFIED

HW-79070

the new gauge, accurate determination of the inside diameter can be measured to $\pm .001$ inch on tubes installed in the reactor. This gauge was designed and developed by Maintenance Practices Engineering.

PLANT EQUIPMENT ENGINEERING

Process Tube Corrosion

Wall thickness gauge measurements obtained during August and September from the B, D, DR, and H Reactors indicate that the process tube corrosion rate was approximately one-third that observed prior to reducing process water pH from 7.0 to 6.6. These data are preliminary since they represent less than one metal cycle at the lower pH. More refined estimates of the comparative corrosion rates will be possible beginning in October from tubes which have operated a full metal cycle at lower pH.

The more encouraging results from recent corrosion data have resulted in canceling extended tube outages previously scheduled at B and C Reactors during the last half of this calendar year. In addition, the number of tubes scheduled for replacement at F Reactor was reduced from 250 to 150, and at H Reactor from 170 to 65.

Evaluation of Corrosion Effects in Reactor Water Plant Piping and Tanks

The results of the study to evaluate corrosion attack of carbon steel piping and tanks are presented in HW-78860. Exact determination of corrosion rate and the effects of 6.6 pH have not been established; however, this study has provided a general analysis of existing carbon steel corrosion attack as well as a guide to future anticipated maintenance and replacement requirements.

Sodium Silicate Corrosion Inhibition of Coolant Backup Systems

It is now apparent that the addition of 10 ppm silicate has been ineffective as an inhibitor and further use is being halted. Planning is now under way to determine either the required silicate concentration level that is necessary for effective inhibition or derive an alternate procedure.

PLANT ENGINEERING

Helium Leak Repair by Foaming, 105-C

Approximately 300 rear face bellows were foamed on the top half of 105-C Reactor. This resulted in a 5000 cubic feet per day reduction in helium loss -- only about half the amount that was expected. Field experience gained in doing this work showed 1) deterioration of the seals to be more severe than previously estimated, and 2) working conditions to be more difficult than planned for. A redesign of tooling will be required to assure the ultimate success of this work.

107-F Basin Repairs

Design is complete for lining the inlet distribution box with steel and for repairing the cracks and expansion joints in the basin. It is planned to perform this work during the November gas leak repair outage at 105-F.

Retention Basin - 107-KW

Inlet chute repairs were completed on B basin. Cracks in the bottoms of A and B basins were also repaired.

Emergency Audible Alarm Standardization - Interim Program, IPD

A design change for the interim program for standardization of emergency audible alarm systems in all IPD buildings was issued for approval signature. A work order was issued for procurement of offsite materials and shop fabrication of critical radiation alarm controllers. The controller components will be preassembled in the shop so that field work will be held to a minimum. Alarms and all materials for shop fabrication have been ordered. The program is on schedule.

Hardness Testing - Horizontal Control Rods

All rods at the five smaller reactors have been checked at least once. Examination of the data and replacement records indicates that half rods are subjected to the annealing effect more than full rods. The annealed condition usually occurs near the tip of the rod.

Vibration of the Rear Risers - All Small Reactors

Amplitude of vibration of the rear risers of the six smaller reactors has been measured under various flow conditions to determine if excess vibration is present. Preliminary studies show the vibration to be negligible except at F Reactor. A report is being prepared.

Audiographic Instruction Programs

A total of 45 people received instruction on the operation and pictorial application of the Polaroid camera.

A program for nozzle bellows foaming for the six smaller reactors was completed and is being used for Special Outage Services personnel.

Pictorial Operating Procedure

Pictorial Detail Operating Procedures for rear decontamination instruction for 105-KE and 105-KW were completed.

Slide-Tape Programs

Two slide-tape programs, 1) Replacement of Bushings and Pivots in Panellit Gauges, and 2) Gas Leak Detection Procedures, were completed. These are currently being used for craft

DECLASSIFIED

HW-79070

Dewcell System - 105-H

In connection with the program to improve the effectiveness of the dewcell systems, sample lines from the plenum chambers in 105-H were cleaned and checked for leaks. A considerable amount of foreign material was found in the lines. Removal resulted in better sampling of the gas atmosphere.

Gas Chromatographs - All Reactors

It was found that during wet reactor conditions an excessive amount of moisture was introduced into the chromatographs, impairing their operation. Design was completed and a design change issued to install driers in the sample lines in all areas to eliminate this problem.

Bristol Metavane Telemetering System

This system, used to monitor reactor inlet and outlet gas pressures at both 105-H and 105-C had a range of 0 to 10 inches of water column. This would not provide the resolution and readability necessary for close control of reactor atmosphere. A design change was issued to change the bellows in the instruments to provide a 0 to 3-inch water column range.

Seismoscopes

Testing is continuing on the newly designed seismoscope circuits to assure a reliable, fail-safe design capable of preventing inadvertent trips. Following completion of satisfactory tests, the circuitry will be installed on the reactors.

C Work Platform - Reactor Face Protection Safety Device

Installation of this equipment is essentially complete except for the "traveling broomstick" in 105-KE and 105-KW. Also, some wiring remains to be done to make connection to the platform control circuit at five reactors (D, KE, KW, H and F). Acceptance tests are currently being run at C, D and DR.

Manager, Manufacturing

OC Schroeder:DLD:bm

DECLASSIFIED

HW-79070

PRODUCTION FUELS

ALSI SHOP

Canning line operating efficiency was 99.2 per cent, 3.2 per cent above forecast.

Manufacturing yields during September improved slightly over those of the previous month and exceeded the forecast. Welding yield on self-support fuels was 95 per cent.

Production of a test quantity (327 elements) of five-inch I&E lithium-aluminum target elements was completed. Late in the month fabrication of special lithium-aluminum control rod elements for N Reactor was initiated.

Production of projection fuels during September was:

	<u>Natural U</u>	<u>Enriched U</u>
Tons produced	93	58
Finished Inventory	379	97

Acceptable Fuel Elements (Tons)

<u>NATURAL</u>					<u>ENRICHED</u>					<u>Total</u>
<u>C</u>	<u>K</u>	<u>Reg.</u>	<u>Bumper</u>	<u>K5NS</u>	<u>C</u>	<u>K</u>	<u>Reg.</u>	<u>Bumper</u>	<u>K5ES</u>	
78.2	68.5	192.4	9.8	85.7	0	0.7	45.0	0.2	48.4	528.9 ⁽¹⁾

Per Cent of Forecast

81	403	167	20	76	-	-	225	-	177	109
----	-----	-----	----	----	---	---	-----	---	-----	-----

Manufacturing Yields

September

95	94	90	84	86	-	-	93	-	82
----	----	----	----	----	---	---	----	---	----

Forecast

90	90	90	85	80	90	90	90	85	80
----	----	----	----	----	----	----	----	----	----

Previous Month

-	90	93	80	84	82	93	93	88	80
---	----	----	----	----	----	----	----	----	----

(1) Includes 10.8 tons of upstream fuels

Operating Conditions, Incidents, and Improvements

There was a significant reduction in the stuck sleeve reject category during September. This reduction is attributed to the use of the vibratory stuck sleeve remover recently placed in service. The present equipment is prototype and is scheduled to be replaced in October by a production model of an improved design. The cost of the equipment is nominal and will prevent damage to a high percentage of elements previously rejected because of sleeve scratches.

Covers were installed on the sleeve storage conveyors to minimize sleeve contamination that could result in fuel element inclusions. In the past, the sleeves have occasionally become contaminated with dirt and foreign particles during movement and storage on the sleeve conveyors. This improvement is expected to enhance fuel element quality and reduce the number of fuels which require re-etching.

Reclamation of "AlSi slop" rejects was initiated on a routine basis in the latter part of the month. To date, only a limited number of these rejects have been reclaimed due to the low canning reject rate. This change in process is expected to improve the yield in this category.

Autoclave Failures

There were no autoclave failures experienced in regular production during September.

MATERIALS

Fuel Recovery

Fuel recovery activities primarily involved the neutralization and recovery of uranium from spent acid from the N Fuels fabrication facility. Two-shift operation of the N Fuels fabrication operation has increased quantity of this material in recent months.

The following AlSi fuel elements were processed through the fuel recovery facilities during September:

Eight-inch Natural	11,454
Six-inch Enriched	4,706
Watermix	425
Total	16,585

Hanford Test Reactor

Available reactor time was utilized as follows: 263 routine production tests were performed (139 go-no-go and 124 drift tests) representing about 70 per cent of the available time with the remaining time (approximately 30 per cent) spent on special testing. This represents an increase of 10 per cent in special testing over the previous month.

DECLASSIFIED

DECLASSIFIED

HW-79070

Inventories

Bare Core Inventory	1705 tons
Finished Fuel Inventory	1395 tons
Work in Process	269 tons

Scrap

Five shipments of metallic uranium scrap were made during September. AlSi scrap included 29.3 tons of natural and 9.7 tons of enriched material. NRD shipments totaled 23.6 tons of enriched scrap. A total of 510 empty boxes with lids was also shipped during the month.

FUELS ENGINEERING

Quality Control

The grooving of aluminum cans to reduce the rejects which are experienced from the seeping of braze material between the can wall and can sleeve (AlSi slopover) has been under study. Six component cans from each of the vendors were polished across the groove and photographed at 50X so a visual comparison could be made. Examination revealed that the can from one vendor, which is one of the best performers in this particular characteristic, had the deepest and widest groove. With this evidence, efforts will be directed toward having other vendors provide similar grooving.

Latest data from the Quality Certification samples indicate warp of standard ingot I&E material (water quenched) may be at an all time low. Average warp for 12 ingots canned during the last quarter of CY 1962 was about 4.2 mils. This is substantially below the previous norm (about 6.3 mils); the downward trend appears to correlate with the use of a new automatic Amsler-Morton heat-treating furnace at NLO.

Four tubes of oil-quenched material, canned during the same approximate period as above, exhibited an average warp of 2.7 mils. This material, in addition to having less average warp, is significantly more uniform. This experience is consistent with that observed in the preliminary production test. On the negative side, 21 per cent of the fuel elements in the oil-quench columns exhibited hot spots. This is considerably above the "expected" number. This may have been due to the fact that each of these columns was irradiated in brand new process tubes. A study of past Quality Certification data will be initiated to attempt to determine effects of tube age on hot-spotting of standard ingot material.

The fourth E-N load was discharged in mid-September at an average exposure of 1090 MWD/T; no ruptures were incurred during the course of irradiation. This experience compares extremely favorably with that of the three prior loads, both in terms of exposure attained and number of ruptures incurred, as illustrated in Table I below:

Load No.	Irradiation Period	Average Core Exposure (MWD/T)	Number of Ruptures (Core & Support Enrichment)			
			Mech. Damage	Other	Corrosion	Total
I	May-Sept. '61	825	1	2*	2	5
II	Sept. '61-Jan. '62	835	3	1**	5	9
III	Jan.-April '63	860	1	1***	1	3
IV	April-Sept. '63	1090	0	0	0	0

* Both failures in same lot; most likely caused by closure defects.

** Failure may have been due to closure defect or due to nonuniform (groove) corrosion.

*** Rupture was classified as a longitudinal split--most likely uranium oriented.

From the above data and total plant experience, it appears that the improved rupture performance is perhaps most strongly related to reactor environmental conditions, e.g., coolant temperature and coolant corrosivity rather than to dimensional stability and bond quality. Mechanical damage failures did not vary significantly between the loads.

A part of the reduction in failure frequency can definitely be attributed to improved closure quality. It is known, from over-all plant experience, that average closure quality of material indicated during the third and fourth loads was markedly superior to material in the first and part of the second loads.

The next loading cycle consists of approximately 40 per cent non-bumpered enriched fuel elements to compare performance with standard bumpered material to normal variable goal (800 MWD/T). In addition, 102 "striped" E-N columns containing five-inch lithium-aluminum target elements were charged under a production test to confirm calculated irradiation advantages over the present four-inch target element.

Rupture Experience

A total of five ruptures were incurred during September 1963.

Fuel Element Type	Tube and Reactor	Exposure (MWD/T)	Rupture Classification	Failure Date	Canning Date
Natural Bumpered	2761-D	545	Side Defect	9/5/63	5/1/63
Enriched Non-Bumpered	3778-C	308	Side Mechanical	9/13/63	4/23/63
Natural Non-Bumpered	3965-KE	1618	Side Hot Spot	9/18/63	11/1/62
Natural Non-Bumpered	3562-B	414	Unknown*	9/20/63	6/19/63
Mixer	3366-D	660	Side Groove Corrosion	9/21/63	3/22/63

* This failure will probably be located and examined. Metal from this charge was pushed into fuel chutes.

DECLASSIFIED

DECLASSIFIED

HW-79070

No unusual trends are indicated by the above experience. The "unknown" failure at B reactor was in dingot material; this is the first failure incurred in the dingot irradiations authorized by Fuel Usage Authorization IP-01-I, "Irradiation of Dingot Uranium Fuel Elements." (HW-77325)

Uranium Technology

As reported above, the post-irradiation warp is currently at an all-time low--probably due to the uniformity of heat treatment from the new salt-heated, water-quench heat-treat furnace at NLO. Furthermore, the warp of the small quantity of salt-heated, oil-quenched material now being irradiated is even lower. Also, recent pre-irradiation data on test quantities of induction-heated, oil-quenched material indicate that these cores may be even more dimensionally stable from a warp standpoint.

These improvements in dimensional stability of the uranium, through modification and control of the heat treatment, promise to have a very significant effect upon the ability of HAPO to use long-duration depleted uranium target elements and high-power, long-exposure driver elements in its various alternate product programs.

Discussions were held with NLO on testing with their grain size testing units in order to eliminate measurement biases between NLO and HAPO. NLO was advised in the use of new grain size standards and calibration procedures supplied by HAPO. This inter-site exchange was stimulated by plans to make grain size testing at the feed site a part of the specification requirements for uranium. Some small detailed problems, including resolving the wording of specifications, still remain to be resolved with regard to specified testing at the feed site.

The external bond and penetration tests are in good control and causing little difficulty. Major hardware and measurement error problems, however, exist with the internal bond and penetration tests. The problem has been traced to a lack of uniformity in the physical positioning of transducers within the probe heads. This lack of probe uniformity causes biases between testers in their sensitivity to nonbond areas--particularly the fine, dispersed type of nonbonding or porosity. A new probe head has been designed to eliminate the variation between probes. Resolution of the problem is not expected for several months due to the time required for procurement of parts and the fabrication time required for the new probes.

AlSi Process Development

The K reactor fuel elements have a lower yield than the other product models. The major reject categories indicate poor braze layer quality. An optimization study is being conducted to determine the canning temperature and preheat time at which the best over-all braze and cladding quality could be obtained. Test results obtained in Pilot Plant experiments have been submitted for analysis. Duplex parameters have also been studied to optimize the uranium-AlSi bond structure.

A new aluminum can base design is proposed to improve the heating rate in the AlSi process and to improve the ease of fabrication by the component vendors. Comparison tests using the proposed step-base design with and without a tapered spire-well have been completed, but not analyzed. The decision to convert to this design awaits this analysis.

A new pressure quench machine design will be required for the production of longer fuel elements. In support of this design and process improvement, thermocouple elements have been canned to determine the time required for the braze alloy of a fuel element to become solid during water and air quench. The AlSi braze layer freezes at about 566 C (due to super-cooling) in one-half to one second after contact with water. Air quench requires from 35 to 38 seconds.

Aluminum components were determined not to be the source of weld porosity by welding tests. Samples of AlSi, taken from the production melts, were welded and every sample showed weld voids very similar to those found in closure welds. The braze layer is the source of weld porosity. There are two major solutions to the problem: (1) reduce the dissolved gases (hydrogen) in the molten AlSi, or (2) eliminate the braze layer from the weld closure. The first method would be very difficult and present a control problem. The second has been attempted in the past by V-grooving the cans or step cutting with AC welding. Work is continuing on the use of DC welding after a step cut.

A production scale evaluation of a light oil as a lubricant for ultrasonic welding was completed on the pilot plant automatic welder. The test involved 15,000 elements concluding the weld strength to be comparable to soap lubrication. The weld time with oil was about half that for soap. An alternate specification allowing oil lubrication is being processed for approval.

The AlSi Shop has processed no elliptical bumper fuel elements this month due to the inability of the equipment to meet specifications. There are two problem areas: (1) marred surface under the support and (2) the end of the support projecting more than 0.006 inches above the surface. Process capability studies have been completed and indicate the process can produce elliptical bumper elements without a marred surface under the rail, but the ends will project 0.015 inches maximum from the surface. Specifications are being reviewed and may be revised to reflect this capability.

Alternate Process Development

The evaluation of the enriched (0.94 per cent) production test fuel elements fabricated by the hot die sizing process has been completed. The fuel elements proved to be of reactor grade quality and in some quality attributes superior to any previously produced. Nineteen charges of 28 fuel elements each were prepared for this production test (PT-IP-616A).

DECLASSIFIED

DECLASSIFIED

HW-79070

Examination of the samples of hot die sized test material selected for metallographic examination shows very good diffusion bonding. Average bond strength, as expressed in pounds force to pull a 0.190 inch diameter stud, for the six-inch hot die sized fuel elements was 745 pounds force, which is equivalent to a tensile strength of 25,330 psi as compared to 13,500 psi for the AlSi fuel elements. Clad thickness testing and measurements have shown good control and more than 25 mil residual clad thickness. The pre-irradiation measurements indicate better dimensional control than previously experienced and the numbers are presently being statistically analyzed.

The charging of the enriched production test at C-pile was completed on September 28, 1963.

The initial production test of natural hot die size fuel elements in C reactor has passed 500 MWD/T exposure without incident.

Aluminum-silicon alloy components for the hot die sizing process have been ordered to gain experience with fuel fabrication and to gain additional corrosion testing data with the new alloys. The alloys ordered are modifications of the aluminum alloy 8001 containing six per cent and ten per cent silicon with and without one per cent magnesium.

The use of tubing to further reduce aluminum component cost for fabricating the inner and outer cladding of the hot die sized fuel elements is being investigated. Bids for 0.055 inch and 0.070 inch thick tubing and four and eight ribbed tubing are being evaluated. Conceptual testing of components on site will begin shortly.

Integral ribbed fuel elements were successfully bonded using heavy smooth wall (0.085 inch) components. Both four ribbed and eight ribbed fuel elements were made. The initial testing was centered on demonstrating whether a bond could be achieved under the rib. Metallographic examination showed that diffusion bonding occurred under the rib as well as the balance of the cladding surface.

Tests of two uranium process variables in the electroplating of nickel on uranium have been evaluated, including the necessity for a spray rinse, following the electrolytic etch, and the effect of employing room temperature 12 M nitric acid in the final deoxidizing step, compared to the standard process. The spray rinse is currently employed following the electrolytic etch to remove a portion of the film formed on the uranium surface. No significant difference in core cladding bond strength was observed comparing 72 bond strength values with spray rinsing to 72 bond strength values without spray rinsing. It was also concluded that while the 12 M HNO_3 produced a more active surface (measured electro-chemically), the resultant reduction in surface area and roughness produces a weaker nickel-uranium bond.

A third production test to produce additional eight-inch normal fuel elements by the hot die sizing process is presently being developed.

A study was initiated to update a previous study of the technology, economics and incentives for the hot die sizing process being developed as an alternate for the present AISI canning process. Based on the potential advantages of the hot die sizing process, it is believed that conversion of fuel manufacturing facilities can be justified irrespective of future production requirements.

Equipment Design and Development

Test quantities of the five concepts of self-support rails were received and scheduled evaluation relative to load deflection, weldability and hydraulic characteristics continued during the month. The major goal of this program is now scheduled to develop a support with acceptable load deflection characteristics, improve welding yield, and eliminate the need for support sizing.

Autoclave testing in four-foot section K reactor zircaloy tubing is being prepared to gain information on capability of the self-support under uranium growth conditions and its related effect in damaging the zircaloy K reactor tubing.

Two major studies are under way to design and demonstrate the capability of an automatic self-support rail feeder. The first concept represents minor investment and utilizes plastic adhesive and a feeding system similar to the elliptical feeder. The second rail feeder will receive the self-supports from vibratory tanks and track feeders provided by an experienced manufacturer. The feeder will be designed to permit manual loading as a back-up for the automatic system. Feeder design is approximately 64 per cent complete, and a purchase requisition was issued for the hopper, vibratory tanks, and track feeders.

Bids were evaluated during this period for seven prototype autoclave cast aluminum liners. This liner is designed to minimize self-support damage and to permit automatic autoclave basket loading at some future date.

PLANT FACILITIES

Status of Active Construction Projects

CAF-954 - High Pressure Autoclave Development Facility

The revised project proposal requesting abandonment of this project was approved by the HAPG General Manager on September 12, 1963, and forwarded to RLOO-AEC for approval.

CAF-961 - Consolidated 303 Area Services Facility - Phase I

This project is to provide a facility, Building 3720, to house widely scattered maintenance personnel and provide laboratory facilities for support of fuel cladding operations. Also provided is critically needed material handling space through an addition to the existing 313 Building. Detailed design for the material handling addition was started last month by the architect-engineer. Preliminary design Title I for the laboratory and shop was reviewed and comments returned

DECLASSIFIED

DECLASSIFIED

HW-79070

to the AEC September 11, 1963. Detailed design for this portion of the project was started by the A-E September 23, 1963. Over-all project design progress is estimated as 61 per cent. A project proposal revision to request the construction funds is in rough draft stage

CAF-973 - Steam Distribution Line Modifications - 300 Area

Construction by the contractor is 20 per cent complete as compared with a schedule of 53 per cent. Partial cause of the delay in progress is due to slow delivery of key material. A revised project proposal has been prepared by the AEC to extend the physical completion date to February 15, 1964.

CAF-979 - Pilot Scale Plating Equipment - 300 Area

The contract for the design and fabrication of the electroplating machine was signed by the low bidder, Abbey Automation Systems, on September 12, 1963. Design was started immediately, and the contractor has expressed confidence in meeting the original December 1, 1963, completion date. A revised design schedule is being developed, however, as any delay in the availability of equipment components would require an extension of time.

CAI-994 - Utilities Extension - 300 Area

Design work by Vitro Engineering is approximately 75 per cent complete as compared with a scheduled 78 per cent.

CAI-107 - Boiler Replacement for Additional Steam Generating Capacity - 384 Building - 300 Area

Specifications for boiler procurement and preliminary work on related equipment was submitted for GE review and comments were forwarded to both Vitro Engineering and RLOO-AEC for their consideration. Design is estimated to be 15 per cent complete.

Utilization of PRTR Waste Steam in the 300 Area Distribution System

The project proposal has been routed for General Electric Company approvals. The design criteria will be submitted with the proposal as required.

Equipment Modifications

The installation of the new line of double spindle automatic welders is approximately 95 per cent complete. Engineering check-out and operation of one of the units is scheduled during October.

Installation of the new autoclave crane was started during the month and has had no adverse effect on operations. Most of the structural reinforcing is completed, steam lines have been re-routed, and the work is expected to be completed during October.

The slower method of curing the lower hearth refractory as recommended by the Ajax Company appears to have been successful. The furnace with which difficulty was experienced was moved into position, after the longer cure at low temperature, and charged with lead. The furnace was operated at normal operating temperatures without any evidence of leakage. This new procedure will be used on a second furnace.

Utilities

<u>Statistics</u>	<u>September</u>	<u>August</u>
Maximum steam generated (M lbs/hr)	60	49
Total steam generated (M lbs)	28,061	25,763
Total condensate returned (M lbs)	5,766	1,616
Coal consumed (tons)	1,345	1,335
Evaporation rate	10.43%	9.56%
Efficiency - actual	81.3	74.5
Efficiency - optimum	81.9	80.7
Import sanitary water (M gals)	144.5	148.0
Peak water consumed in 24 hours (M gals)	5.2	5.3
Compressed air production (M scf)	38,226	41,054
Peak water flow (gpm)	5,800	5,400

A study has been conducted and a report is being prepared concerning the compressed air capacity and reliability in the 300 Area. Results to date indicate that an additional air compressor is not required at this time.

The final cut-over to the new motor control center was completed during the scheduled power outage on September 4, 1963.

The overhaul of No. 6 boiler is approximately 80 per cent complete. All major work has been completed. Both the forced draft and induced fan motors were given complete overhaul.

Plant Services

Production through the duplicating shop increased 17 per cent over the previous month while the number of orders decreased slightly.

A study covering the mail handling function was completed, and as a result revised schedules have been established.

DECLASSIFIED

W. M. Mobley
Manager, Production Fuels

WN Mobley:HFT:sh

DECLASSIFIED

HW-79070

RESEARCH AND ENGINEERING

PROCESS AND REACTOR DEVELOPMENT

REACTOR FUELS

K Reactor Self-Support Fuel

Ten columns of KVNS fuel elements charged into KW Reactor during the August 1, 1963, outage are currently at an average tube exposure of about 230 MWD/T. The elements were charged under authority of Production Test IP-572-A, Supp. A, to evaluate the effects of displacement charging on the irradiation behavior of the self-support fuel. Discharge of these ten fuel columns is scheduled for average tube exposures of 800 MWD/T.

Hot-Die-Sizing

Two columns of hot-die-sized diffusion-bonded fuel elements at average tube exposures of 380 MWD/T were discharged from C Reactor during the outage of September 13, 1963. Visual examination of these elements revealed no abnormal corrosion attack to the fuel. Companion Al-Si bonded elements were also free of any unusual corrosion. The remaining 18 fuel columns of this test, currently at average tube exposure of 420 MWD/T, are scheduled for discharge at 800 MWD/T.

REACTOR ENGINEERING

Examination of KE Reactor Moderator Stack

During the recent KE Reactor outage for zirconium retubing, traverses of eight VSR channels were made. Inspection of nine channels was attempted, but Channel No. 50 was found to be completely blocked at the upper portion of the stack and could not be measured. Channel No. 42 was found to have a total width of 5-1/2 inches in the near-to-far axis, as compared to a laid-up width of 3-3/4 inches. The location of the widest point was near the bottom of the channel. Similar, but less extensive, opening of the VSR channel was found to exist for fringe-zone channels. In the central-zone channels examined, widening in the front-to-rear direction was observed. Each channel examined was photographed with moving picture equipment, as a permanent record of the current condition of the channel.

REACTOR PHYSICS

Alternate Products

Brandy

The percent of recycle fuel in the enriched fuel present in the reactors at the end of August and in the fuel discharged during August is as follows.

DECLASSIFIED

D-2

HW-79070

STATUS REPORT OF PRODUCTION TESTS

<u>Test No.</u>	<u>Type Metal</u>	<u>Tubes</u>	<u>Reactor</u>	<u>Goal Exposure</u>	<u>Current Exposure</u>	<u>Remarks</u>
IP-216-A	Normal prod. natural and enriched fuel elements.	65	All	Normal 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 and IP-431-A	I&E self-supported fuel overbore size.	62	C	800 MWD/T		Provides preliminary qualitative data regarding irradiation behavior of larger fuel element designs.
IP-546-A	I&E self-supported, hot-die-sized fuel.	20	C	800 MWD/T	450 MWD/T	Initial irradiation of hot-die-size diffusion bonded fuel elements. Test columns charged on 7-27-63. Test will provide information for evaluation of relative corrosion characteristics of this new fuel.
IP-572-A Supp. A	I&E self-supported fuel.	10	KW	800 MWD/T	270 MWD/T	Evaluation of displacement discharging effects on temperature distribution of eccentric placement of fuel elements in smooth process tubes. Test charged on 8-1-63.
IP-614-A	Metallic thorium target elements.	1	F	60 Operating Days	7 Operating Days	Initial irradiation of metallic thorium target elements in support of the U-233 Program. Three target pieces charged into one central zone process tube on 9-12-63.

Percent of Recycle Fuel in the 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>
August 31 Status	100	100	100	100	100	~100	100	100
August Discharge	100	100	a	100	100	a	a	100

a - No or essentially no enriched fuel discharged.

The buildup of neptunium-237 in the overbore size fuel irradiated in the C Reactor was determined from special irradiation and separation. Preliminary data are given below and a comparison for CIIN fuel is also shown.

<u>Fuel Exposure</u> <u>MWD/T</u>	<u>Np-237 g/ton</u>		
	<u>CVIN</u>	<u>CIIN</u>	<u>CVIN/CIIN</u>
382	1.77	1.13	1.57
408	1.76	1.22	1.44
714	3.65	2.38	1.53
790	3.71	2.65	1.40

U-233

The four one gram samples of thorium oxide of various thorium-230 content, which were irradiated in DR Reactor by Hanford Laboratories for 27.7 days, have been analyzed. The results are as follows:

<u>Sample</u> <u>(Th-230 Content)</u>	<u>Grams U-233/Ton</u> <u>ThO₂</u>	<u>ppm U-232</u>
0.17 ppm	1593	2.81
0.37 ppm	1631	2.74
1.24 ppm	1622	2.97
82.8 ppm	1641	24.2

These results overestimate the actual U-233 yield because the thermal flux in the samples is not depressed since the amount of thorium is so small. Also, the effective resonance integral for thorium-232 is higher for the small samples than for a production size element. Both of these factors will reduce the grams per ton of thorium oxide for the production case since both the 2200 m/sec flux and the cross section will be smaller. The ppm U-232 will be also reduced by the reduction of the 2200 m/sec flux because of protactinium-231 in the production chain for U-232. The n,2n reaction rate in thorium-232 will be unaffected by the size of the thorium elements.

Three thorium target elements were charged into an F Reactor central-zone process tube, during the September 9, 1963, outage. The target pieces are scheduled to receive a 60-day irradiation.

E-D Loading

A document is being prepared on the technical feasibility of depleted uranium irradiation for both the smaller and K Reactors. This document will be sufficiently general to allow any reader ample information for any percent Pu-240 plutonium desired from 0.200 percent depleted uranium irradiations in the eight operating production reactors.

An upper limit based on fuel element lifetime for the percent Pu-240 plutonium produced from the irradiation of 0.200 percent depleted uranium is about 21 percent in the six smaller reactors and about 19 percent in the K Reactors. These percentages are tube averages and are obtained at about 1900 MWD/T. Tubes having an average of 21 percent product in the six smaller reactors will have about 25 percent Pu-240 plutonium in the central portion of the tube. An error analysis based on expected neutron temperature uncertainty and comparison with an E-D load isotopic analysis yielded five percent relative error in the percent Pu-240 calculated.

Safety Control Elements

New VSR Sample Testing

Samples of the boron steel tubing from which the new universal vertical safety rods are being made are currently being checked, as received, in the Hanford Test Reactor. These samples are being compared with a "B" size VSR section which is being used as a standard. Relative worths of the test specimens are given below.

New VSR Sample Reactivity Worths				
Sample No.	Worth of Standard VSR (ih)	Worth of Sample VSR (ih)	Relative Worth	
			As Taken	Normalized ^(a)
105-3	63.59	64.42	1.013	1.013
107-3	65.74	67.93	1.033	1.033
111-3	65.74	68.71	1.045	1.045
113-3	65.74	68.23	1.038	1.038
115-3	65.74	68.23	1.038	1.038
117-3	64.64	66.88	1.035	1.035
119-3	65.74	67.23	1.023	1.023
121-3	65.74	68.23	1.038	1.038
123-3	63.81	65.84	1.032	1.031
125-3	63.59	66.00	1.038	1.037

(a) Normalized to standard VSR worth of 65.74.

The relative worths have an estimated range of values of plus or minus 0.006 due to the variation within the testing procedure.

DECLASSIFIED

RADIOLOGICAL ENGINEERING

DECLASSIFIED

Radiation Control Experience

The following table summarizes the radiation exposure experience of critical IPD classifications through 32 weeks of the 1963 badge year:

<u>Classification</u>	<u>Total Dose</u>	<u>No. of Employees</u>	<u>Average Dose/Employee</u>	<u>Extrapolated Year End Average</u>	<u>No. of Employees over 3r Extrapolated Exposure</u>
Radiation					
Monitors	128065 mr	77	1663 mr	2704 mr	15
Processing					
Operators	364942	253	1442	2342	20
Pipefitters	187935	126	1491	2418	24
Millwrights	149349	104	1436	2340	30

Lapse of Radiation ControlDistribution 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 Totals</u>
Processing				1	2	1	2	1	7
Maintenance									0
Suppl. Crews						1		1	2
Special Outage Service							3	1	4
Central Maintenance									0
Research and Engrg.								1	1
Facilities Engrg.									0
Applied Reactor Engrg.									0
Reactor Area									0
IPD General									0
Unassigned				1					1
	0	0	0	2	2	2	5	3	14

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

There were 14 Lapses of Radiation Control. Nine lapses involved skin and/or personal clothing contamination including two cases of nasal contamination. There were two cases where high dose rate conditions were uncontrolled. Two lapses involved spread of contamination outside radiation zones, and one involved an employee working in a radiation zone without his film badge.

Effluent Activity Data

The table below shows average concentrations of selected radionuclides from reactor effluent samples taken during August 1963. All units are 10^{-12} curies/ml.

<u>Reactor</u>	<u>P-32</u>	<u>As-76</u>	<u>Zn-65</u>	<u>Np-239</u>	<u>Cr-51</u>
B	1.5	106	4	145	360
C	8.3	189	7	240	1030
D	3.8	83	9	130	520
DR	3.9	93	6	155	950
F	8.8	85	9	155	620
H	12.9	50	7	105	640
KE	8.0	38	9	100	320
KW	3.2	23	-	80	210

There were no significant changes made in the treatment of reactor coolant at any of the water plants during August.

DECLASSIFIED

PROCESS TECHNOLOGY

DECLASSIFIED

REACTOR POWER LEVEL LIMITATIONS

Power levels at all reactors were restricted by the 95 C bulk outlet temperature limit.

PROCESS STANDARDS

HW-46000 B, F, and K, Process Standards - Reactor

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

Process Standard A-050 - "Panellit System Control"

All references related to poison column control facility were deleted. Authorization to bypass a gauge for two hours to repair a leaking sensing line was added.

Process Standard C-120 - "Poison Splines"

Provisions were added for use of nonpoisonous flux traversing splines and for color coding of splines.

HW-46000 H, Process Standards - Reactor

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

Process Standard A-050 - "Panellit System Control"

The requirement to observe the gauge continuously during charge and discharge of PCCF tubes has been modified to require observation during charging operation only. Authorization to bypass a gauge for two hours to repair a leaking sensing line was added.

Process Standard C-120 - "Poison Splines"

The provisions in this revision are identical to those made for B, F, and K, above.

PROCESS CHANGE AUTHORIZATIONS

Fourteen Process Change Authorizations were issued during the report period: seven to permit deviation from Process Standards - Reactor, HW-46000, and seven to permit temporary deviation from Process Standards - Water Plant, HW-27155 Rev. 1. These were:

PCA #3-78 - "Emergency Removal of Steam Driven Export Pump - B Area"

The expiration date of PCA #3-71 was extended to provide additional time for

turbine maintenance. PCA #3-78 required operation of two steam-driven export pumps while the B Area pump is out of service.

PCA #3-79 - "Emergency Removal of Steam-Driven Export Pump - D Area"

This process change authorized taking the D Area export turbine out of service for a maximum of two hours to make emergency repairs while the B Area turbine was also out of service, provided both the H and F Area export turbines were placed in operation and provisions were made to restrict 200 Area and N Area flow within 15 minutes following a BPA power interruption.

PCA #3-80 - "Removal of High Tank Crosstie Line From Service - C Reactor"

Authorization was given to lower last-ditch system backup to one full high tank automatically available plus raw water manually available after the reactor was shut down for more than 10 hours.

PCA #3-81 - "Graphite Temperature Limits - K Reactors"

This process change modifies the provisions of PCA's #3-39 and #3-43 which provided interim reactor atmosphere and graphite temperature operating limits during installation of zirconium tubes in the K Reactors.

PCA #3-82 - "Lower Sodium Dichromate Requirements During Reactor Shutdown - All Reactors"

Authorization was given to lower sodium dichromate concentration requirements to 1.0 + 0.1 ppm during reactor shutdown. Economic benefit is the main justification. No increase of corrosion is expected.

PCA #3-83 - "Graphite Temperature Limits - C Reactor"

Reactor operation with graphite temperatures above the limit was authorized for a short period provided immediate steps were taken to bring the graphite temperature within limits.

PCA #3-84 - "Inoperative Check Valve, No. 2 Diesel Pump, Last-Ditch Water Supply - K Reactors"

This process change permitted removing one diesel pump from service for necessary repairs provided a man was stationed to manually start either diesel that failed to start automatically.

PCA #3-85 - "Resetting of Low Sensitivity Seismoscope Pendulum Contacts - All Reactors"

This PCA extended the expiration date of PCA #3-37 to allow more time to obtain approval of the revised Process Standard. PCA #3-37 authorized a contact spacing of 1.3 MM on the low sensitivity pendulums.

DECLASSIFIED

DECLASSIFIED

HW-79070

PCA #3-86 - "Horizontal Bowing Measurements - All Reactors"

Deferment of horizontal bowing measurements was authorized to provide time for scheduling use of new instruments and measuring equipment.

PCA #3-87 - "Beckman Amplifier Reading Low - KW Reactor"

Authorization was given to operate for a short period with flux monitors reading less than four major divisions since the low readings were caused by a temporary condition.

PCA #3-88 - "Confinement Steam Exhaust Fans Inoperable - C Reactor"

This process change authorized removing the steam supply to the exhaust fans for a period of two hours provided no critical power grades existed, no tubes were uncapped, and no burning or welding was done in contaminated areas.

PCA #3-89 - "Leaking Spline Seal 1179 - KW Reactor"

Authorization was given to install a cap sealing device to avoid a possible scram from a leaking spline seal on tube 1179.

PCA #3-90 - "Removal of Steam-Driven Export Pump at D Area"

This PCA permitted removing the D Area export steam turbine from service for a maximum of eight hours provided the B Area turbine was operating, the F and H Area turbines were placed on Copes control, and provisions were made to restrict 200 Area and N Area flow within 15 minutes following a BPA power interruption.

PCA #3-91 - "Removal From Service, Export Steam-Driven Pumps - B, F, and H Reactors"

This process change permitted removing a steam-driven export pump from service at B, F, and H Areas provided only one turbine was out of service at any one time, good assurance existed that at least two pumps would be available during an emergency, and provisions were made to restrict 200 Area and N Area flow within 15 minutes following a BPA power interruption.

TEMPORARY NUCLEAR SAFETY SPECIFICATIONS

TNS #1-63 - "KVE and CBD2E 0.96 Per Cent Enriched Fuel Elements"

This temporary specification authorized the use of Nuclear Safety Specification NS 3 for KVE fuel elements and NS 3.05 for CBD2E fuel elements, except for the restriction that only 360 pieces of CBD2E may be placed in existing auto-claves.

MEMORANDUM OF PROCESS STANDARDS RELAXATION

This memorandum authorized operating with the gas atmosphere pressure at C

DECLASSIFIED

HW-79070

Reactor negative with respect to the rear face atmosphere provided this would only be done for a short time and rigid gas purity specifications were adhered to.

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</u>	<u>Exposure MWD/T</u>	<u>Type Failure</u>
9/5/63	2761-D	CZ-041-Z	I&E NB	1068	545	SL
9/13/63	3778-C	KC-227-B	I&E E (0.94%)	1195	308	SD
9/18/63	3965-KE	KF-498-A	I&E N	1513	1618	SH
9/20/63	3562-B	PZ-045-A	I&E N	1145	414	UN
9/21/63	3366-D	KD-058-D ¹	I&E NB	1087	660	SG

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. The fuel is irradiated in ribbed process tubes.

I&E E - This is the symbol for internally and externally cooled production reactor fuel elements with uranium cores enriched in U-235. The fuel is irradiated in ribbed process tubes. The weight per cent U-235 in the core material is stated.

I&E N - This is the symbol for internally and externally cooled production reactor fuel elements of natural uranium. The fuel is irradiated in ribbed process tubes.

First Character

S Side - Failure occurred on the side of the fuel element.
U Unknown - Location of failure is not known.

¹ Six-inch internally and externally cooled natural uranium fuel element with attached water-mixer spool.

DECLASSIFIED

HW-79070

Second Character

L	Ledge corrosion	Failure caused by ledge or other uniform corrosion attack.
D	Mechanical damage.	Failure caused by mechanical damage to the fuel element.
N	Not examined	Failure has not been examined.
G	Groove corrosion	Failure caused by groove pitting corrosion attack.
H	Hot-spot	Failure caused by accelerated high temperature corrosion attack.

OPERATIONAL PHYSICS

PILE PHYSICS PLANT ASSISTANCE

With few exceptions the production reactors operated with good flattening, low nonequilibrium losses, and good operating continuity during the report period. Due primarily to the zirconium-tube-replacement outage at KE and the E-N discharge at H, those two reactors had considerable nonequilibrium operation.

The H Reactor irradiation of the fourth E-N core load was completed with a final exposure of about 1090 MWD/T. Although flux-distribution control was slightly more difficult than usual due to the larger transient magnitudes accompanying high exposure, normal control techniques were quite adequate.

The K reactors have both passed the halfway point in zirconium retubing. Initially assumed values for temperature coefficients in the zirconium lattice tentatively agree with observed data; startup prediction errors at these two reactors appear to be related to other poison loading and calibration evaluations. Hold-down (total) control requirements in the shutdown reactor are more restrictive in the zirconium loading when the limiting case is selected as uranium melting temperature rather than aluminum melting temperature.

Long-term reactivity gains at B Reactor (operating under a high-temperature-graphite PT for some time) have occurred faster than expected; F Reactor is now on the same production test (PT IP-593-J) and is adjusting the CO₂ increase based on B Reactor experience.

There were two separate occasions of rod coolant loss at C Reactor. No apparent power excursions accompanied the rod water loss, and with minor supplementary control adjustments, efficient operation was maintained.

SUMMARY OF OPERATIONAL DATA OF PHYSICS INTEREST
FOR THE MONTH OF SEPTEMBER, 1963

Reactor	B	C	D	DR	F	H	KE	KW
ECT in September (1)	1470	1660	1525	1550	1555	1480	Not at equil.	2510
12-Month Average ECT	1505	1645	1495	1510	1495	1500	2480	2505
Equil. Scram Time (2)	15-20	20-22	14-16	17-20	15-20	20-25	20-25*	25-30*
Recording Time								
From:	8-20	8-20	8-20	8-21	8-22	8-21	8-21	8-20
To:	9-19	9-17	9-19	9-18	9-20	9-20	9-20	9-20

*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 which may elapse between scram and first indication while still permitting a successful scram recovery.

DECLASSIFIED

DECLASSIFIED

HW-79070

B Reactor - C. E. Hughey/J. R. Fredsall

Operation was essentially continuous over the report period with minimal non-equilibrium losses. Flattening efficiency during the transition to a high-CO₂ atmosphere was lower than normal (PT IP-593-J). Observed reactivity gains due to the high graphite temperatures, at helium concentrations as low as 38 per cent, have been larger than expected. Reactivity data is currently being subjected to machine analysis in an effort to better evaluate both immediate and long-term transient effects of moderator-coefficient effects.

C Reactor - P. D. Gross

Although operation was interrupted by several unscheduled outages, flattening efficiency was high and nonequilibrium losses were low. Two shutdowns resulted from loss of rod coolant. As a direct consequence, the reactor operated over most of the report period with number 14 rod out of service. No power excursion accompanied either occasion of HCR water loss. Distribution control was satisfactorily maintained with the aid of supplementary poison adjustments.

Three new smaller VSR's have been installed in place of the original rods to improve the reactor speed-of-control status.

D Reactor - G. D. Baston

Record high flattening efficiency and operating continuity characterized D Reactor operation during the period. Nonequilibrium losses were higher than normal, due mainly to a prolonged Panellit checkout on startup.

Investigation of the problem mentioned in last month's report (failure of the HCR system to scram on the shutdown of 8-5-63) has been completed; the failure was apparently due to dirty electrical contacts. A test during the last outage indicates that the system is back to normal.

Total control restrictions have recently required increased supplementary poison due to a combination of high exposure and temporary loss of a geometrically important VSR (number 37) from service.

DR Reactor - S. M. Skidmore

Nonequilibrium losses during the report period averaged less than one-half the preceding 12 months' average following increased emphasis on this subject in conjunction with the reactor specialists. Operating continuity and flattening efficiency were correspondingly high during the period.

A routine diatomaceous earth purge during low-level operation resulted in a small power surge as indicated on the subcritical monitors; the same problem had been previously noted at C Reactor and is still under investigation.

F Reactor - D. W. Constable

Flattening efficiency was better than average during the report period; however, reported nonequilibrium losses were a bit higher than the previous year's average due to inclusion of secondary cold startup losses with normal cold startup losses in the NEL.

At the end of the report period F Reactor elected to adopt the high graphite temperature production test with maximum graphite temperatures to be limited to 735C. B Reactor observations are being factored into the changeover.

H Reactor - E. L. Conner, Jr.

The fourth E-N core loading was discharged during the month after a highly successful irradiation cycle. High residual exposures (approx. 1090 MWD/T) limited operating efficiency at the end of the run. Individual tube temperatures approached TAI limits following one hot startup due to inadequate far-side distribution control, possibly due to holding power level constant at the recovery level for too long a period.

The fifth E-N load (third in 1963) is now charged; it includes 102 special central tubes in which the normal (18-4.2"N)/(5 cols.) configuration has been replaced by a simpler array of (3-5"N)/(col.), to evaluate potential savings in charging efficiency.

Results of a scram transient test just prior to the discharge outage agree with previous test results and analytical predictions of a small graphite temperature coefficient of reactivity (relative to normal uranium transients).

KE Reactor - D. G. Albertson

The reactor was in shutdown status until 9-11-63 for the second zirconium-tube outage, and equilibrium was not reached during the remainder of the report period.

A sizable conservative prediction error on the 9-11-63 startup resulted from underevaluation of the large number of splines used (200). An unscheduled outage followed because of insufficient excess in rods for distribution control as equilibrium was approached with still too many splines in the reactor. Reactivity observations during subsequent operation confirmed that the error was not associated with zirconium-changeover reactivity evaluations.

A change in total control requirements to ensure subcriticality up to uranium melting temperature rather than to aluminum melting temperature in the zirconium loading requires substantial additional supplementary control during early outage conditions. The bases for melting temperature requirements are being reviewed with regard to the considerable number of aluminum tubes still left in the K reactors both in the fringes and for central spline use.

DECLASSIFIED

DECLASSIFIED

HW-79070

KW Reactor - A. W. Medcalf/R. A. Chitwood

Although several scrams interrupted operating continuity, flattening efficiency was good and nonequilibrium losses were lower than average. There were no extended outages for zirconium-tube replacement during the report period.

PROCESS PHYSICS STUDIES

REACTIVITY AND SAFETY CONTROL STUDIES

An evaluation is underway to determine the degree of relief in hold-down (total) control requirements during outages as a function of flattening at the K's. Recent operating efficiency studies had indicated that ECT could be varied rather widely with marginal effects on total production and unit cost. It is desirable for economic reasons that the outer ball channels not be in the safety circuit to any greater degree than necessary for covering total control criteria.

Criteria have been developed for performance of the Zone Temperature Monitor under test conditions simulating safety system use. Trip requirements for a ZTM system in the C and H Reactors are being investigated; it is expected that their limits will be very close for those of B-D-DR and F Reactors.

Conversion-ratio calculations for accountability purposes showed that the effects of nickel cladding as a substitute for aluminum are negligible. In a particular case calculated, less than 0.01 per cent (0.0001) difference in conversion ratio was indicated from the change in cladding material.

CONTROL EFFICIENCY STUDIES

Fifteen six-inch spline samples, reactivity-tested in the HTR, demonstrated that an earlier low-boron test sample from that same lot was not indicative of the lot. Reactivity effectiveness of the 15 samples agreed closely in each case with the six-inch standard.

Results of examination for embrittlement of three irradiated splines, each with approximately 60 days exposure, have been inconsistent. One regular and one clad spline were quite brittle, whereas a second clad spline was not noticeably brittle. Unirradiated samples of these splines had shown no embrittlement. Several 12-inch samples of these splines were saved for tensile tests along with other burnout test samples having over 120 days' irradiation.

The fifth E-N core load in the H Reactor began its irradiation near the end of the report period.

Startup losses for the eight reactors averaged 0.26 day per startup for the first eight months of 1963; this compares to 0.31 day per startup during the same interval in 1962.

The production test to authorize test demonstration of the automatic distribution control concept in the D Reactor is being circulated for approval. N Reactor Department has agreed to finance remaining costs on the installation of the test equipment.

BIOLOGICAL SHIELD PROTECTION

Biological shield temperatures are known to increase as the conductivity of the reactor atmosphere is decreased. Current data indicate that fringe poison will probably be required in the 46 row and 96 column in all of those reactors with uncooled biological shields (B-D-DR-F-H) if they are permitted to increase graphite temperatures through the addition of CO₂.

REACTOR FUNDAMENTALS TRAINING

The program of providing supplemental lesson and quiz material for the "In-Area Training Program," initiated by 16 lesson assignments on reactor operating physics, is being extended by Reactor Processing Certification Subsection to the other 14 chapters of the certification study material.

DECLASSIFIED

TESTING

DECLASSIFIED

IRRADIATION TESTINGIrradiations - Sample and experiment irradiations were handled as follows:

Reactor	Test Hole	Facility	Request No.	No. of Samples	Material-Purpose
KE	2D	Quickie	HAPO-184	29	Washington Designated Program
KW	2A	Quickie			
KE	2D	Quickie	HAPO-252	6	Thorium (activation analysis)
KW	2A	Quickie			
KW	4B	Snout	HAPO-226	2	Uranium-tungsten (high temperature stability study)
B		Process Channel	HAPO-098	100	Graphite (burnout rate study)
C		Process Channel			
H		Process Channel			
KE	3C	Bare Channel	HAPO-177	23	Graphite (neutron irradiation damage study)
KW	2C	Bare Channel			
C	Y	Bare Channel			
F	E	Quickie	HAPO-219	3	Strontium (tracer isotope production)
F	E	Quickie	HAPO-223	1	Uranium (fission fragment damage study)
KW	4C	Snout	HAPO-243	9	Iron (fast neutron damage study)
F	E	Quickie	HAPO-249	7	Flux monitors (flux monitor standardization and development)
KW	4B	Snout	HAPO-249	2	Boron-graphite (heat generation and transfer study)
KW	2A	Quickie	HAPO-252	2	Arsenic (tracer isotope production)
DR		PCCF	HAPO-254	4	Effluent water salts (reduction of radioisotopes in river water study)
KE	2B	Magazine	HAPO-263	1	Plutonium (neutron detector development study)
KW	4B	Snout	HAPO-263	1	Boron detector (neutron detector study)
KW	4B	Snout	HAPO-270	11	UO ₂ (crystal structure formation study)
DR		PCCF	HAPO-286	1	U-235 (production of Pm-146)
		Gamma*	HAPO-171	3	Plastics and rubber (radiation damage study)
		Gamma		3	N-seal bushing (radiation damage study)
		Gamma		1	Hose (radiation damage study)

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

Borescoping Activities - In-reactor channels and tubes were examined with a borescope as follows:

<u>Reactor</u>	<u>Channel or Tube</u>	<u>Motion Picture Record</u>	<u>Purpose</u>
KE	VSR-17	Yes	1)
KE	ECR-42	Yes	1)
KE	ECR-43	Yes	1)
KE	HCR-44	Yes	1)
KE	HCR-45	Yes	1)
KE	HCR-46	Yes	1)
KE	HCR-47	Yes	1)
KE	HCR-48	Yes	1)
KE	HCR-49	Yes	1)
KE	HCR-50	Yes	1)
KE	Process Channel 3965	No	2)
D	Process Channel 3586	No	2)
H	Process Channel 3780	No	2)
H	Process Channel 3965	No	2)

- 1) Horizontal rod, vertical rod channels problem
- 2) Maintenance support

Spline Traversing - Front-to-rear flux distribution data were obtained from the following reactors:

<u>Reactor</u>	<u>No. of Tubes</u>
B	4
C	6
D	8
F	8
H	6

C-1 Loop Installation - The in-reactor test section was installed on August 26, and single-pass cooling was started. Acceptance tests are being performed and dummy fuel is being charged during the current C Reactor outage in preparation for loop flow characteristics tests.

COMPONENT TESTING

Irradiated IPD Fuel Examination, 105-C Facility - Examinations were completed on fuel elements from 45 tubes requiring 228.8 fuel examination units. Individual examinations completed were 5632.

DECLASSIFIED

DECLASSIFIED

HW-79070

No. of Tube Charges

Production Test

17	IP-216-A, Evaluation of Normal I&E Fuel Element Performance
8	IP-442-A, Half-Plant Reduction in Process Water pH, 105-C
4	IP-476-AL, Irradiation of Dummy Fuel Elements in Tube 2952-KE
5	IP-524-AL, Testing in 1706-KE Single-Pass Tubes of Quachrom Glucosate as a Replacement for Dichromate
7	IP-586-AIE, Extended Goal Exposure for Selected KVNS Fuel Columns
4	None - examination of fuel elements suspected of being rupture prone

Irradiated NRD Fuel Examination, 105-KE Facility - Flux distribution, weight measurements, and visual examinations were obtained on seven lithium-aluminum target pieces and five NIEL fuel elements irradiated under PT IP-584-D. Targets and inner elements were discharged from KER-1 August 22.

Irradiated Process Tube Measurements

Wall Thickness Gauge (eddy-current type) - WTG

<u>Reactor</u>	<u>No. of Tubes Measured</u>	<u>Report No.</u>	<u>HW No.</u>
DR	148	52	78823
D	121	53	78919
F	156	54	78966
H	833	55	79020
Total	1258		

Sector Annulus Gauge (eddy-current type) - SAG

<u>Reactor</u>	<u>No. of Tubes Measured</u>
H	8
B	4
D	1

Visual examination and actual measurements were completed on five process tubes removed from the reactors:

<u>Reactor</u>	<u>No. of Tubes</u>	<u>Tube Samples Measured</u>	<u>Reason Examined</u>	<u>HW No.</u>
C	2	96	1-damaged during #28 VSR channel drilling, 1-leaking	79026

<u>Reactor</u>	<u>No. of Tubes</u>	<u>Tube Samples Measured</u>	<u>Reason Examined</u>	<u>HW No.</u>
D	2	88	Evaluation of corrosion under PT IP-542-A, Half Plant Reduction in Process Water pH	79025
KE	1	58	Routine corrosion evaluation	78898

Critical Reactor Component Examination - Examination of all KE Reactor front tube sleeve retaining rings was completed. No rings were broken.

Panellit System Programs

Gauges repaired, calibrated by Maintenance	-	41	
Gauges meeting calibration criteria	-	35	(85%)
-previous month	-		(91%)
In-board gauge reliability examination	-	92	
Gauges meeting examination criteria	-	91	(99%)
-previous month	-		(98%)
-average for past year	-		(96%)
Response time determination	-	92	
Gauges meeting response criteria	-	92	(100%)
-previous month	-		(100%)
-average for past year	-		(99.8%)
In-board Bourdon coil examination	-	7000	
Non-leaking coils	-	6987	(99.8%)
-average rate for past two years	-		(99.8%)
G Gauges receiving failure analysis	-	45	
2B-X1 switch examination	-	450	
-acceptance rate	-	384	(85%)
-previous month	-		(80%)
Gauges received from vendor and examined	-	322	
-acceptance rate	-	251	(78%)
-previous month	-		(82%)
Gauges received from Central Maintenance and examined after pivot-bushing replacement	-	423	
-acceptance rate	-	356	(84%)
-previous month	-		(79%)

DECLASSIFIED

One hundred eighty-two gauges were removed from panels for new gauge installation and prepared for shipment to the vendor as exchange gauges.

COOLANT TESTING

KER Loop Operation

KER-1 - On September 9, the loop was charged with four stainless steel clad fuel elements for use as crud detectors and four 17-inch NIEL fuel elements as authorized by PT IP-601-D. Two of the crud detectors are instrumented with thermocouples and the other two are not instrumented. The objective of this test is to further evaluate the effects of ammonium hydroxide for coolant pH control, particularly the crud forming and decomposition characteristics of ammonium hydroxide at conditions approximating those expected at N Reactor.

KER-2 - Testing of eight 9-inch lithium-aluminum target elements with six NIEL fuel elements as authorized by PT IP-584-D was continued. The purpose of the test is to evaluate target element swelling characteristics and lithium and tritium migration at conditions approximating those expected at N Reactor.

KER-3 - Testing of thirteen 23-inch NAEI fuel elements as authorized by PT IP-477-A continued. The objective of the test is to evaluate the irradiation behavior to N Reactor fuel elements at conditions equivalent to or more severe than those expected at N Reactor.

On September 22, the loop pressure and temperature were reduced to minimum values due to second-stage impeller failure on one of the primary pumps.

KER-4 - Testing of fourteen NAEI fuel elements as authorized by PT IP-477-A continued.

Single-Pass Tube Operation - 1706-KE

<u>Tube</u>	<u>Production Test</u>	<u>Water Supplied</u>	<u>Corrosion Inhibitors and Chemical Additions</u>	<u>pH</u>
SP-1 (2952)	IP-476-AL	Process	1.8 ppm dichromate	6.6
SP-2 (3050)	IP-555-A	Service	10 ppm silicate	6.6
SP-3 (4355)	IP-520-A	Pilot Plant	1.8 ppm dichromate	6.6
	Supp. A			
SP-4 (4456)	IP-520-A	Pilot Plant	1.8 ppm dichromate	6.6
	Supp. A			
SP-5 (4457)	IP-524-AL	Service	0.2 ppm quachrom glucosate	6.6
SP-6 (4863)	IP-524-AL	Service	0.2 ppm quachrom glucosate	6.6
SP-7 (4963)	IP-449-A	Deionized	0.2 ppm sulfate	
SP-8 (5063)	IP-449-A	Deionized	0.2 ppm sulfate	

KE Reactor Outage Time Requirements

No unscheduled outages were charged to production testing. A total of 3.2 outage hours was charged to production tests as listed below:

<u>Production Test</u>	<u>Description</u>	<u>Hours</u>
IP-449-A	Install coupon holders in single-	1.6
IP-476-AL	pass and control tubes	
IP-520-A		
IP-524-AL		
IP-555-A		
IP-601-D	Charge KER-1 and pressure test	1.6

Out-of-Reactor Facility Operation

TF-3 - Testing to evaluate crevice corrosion beneath Zircaloy-2 fuel element supports with ammonium hydroxide used for pH control was continued. Operating conditions are 315 C, 1985 psi and pH 10.0.

TF-4 - Testing to evaluate single-step carbon steel decontamination procedures was completed. Testing was started for determining the effects of the presence of oxygen on the corrosion rates of coupled and uncoupled carbon steel when using the Sulfam-6 decontamination process. Pre-filming operating conditions are 1600 psi, 300 C and pH 10.0.

TF-7 - Fretting corrosion testing of various materials continued. Also, facsimiles of NPR steam generator tube ends are being thermally cycled to obtain development data. Testing of three facsimiles was completed during the report period.

The test sections contain the following materials:

1. A PRTR fuel element with an end bracket design employing a full 360° contact area with the process tube for fretting corrosion studies
2. Two dummy Zircaloy-2 clad elements for uniform corrosion testing of supports
3. Two NINL fuel elements for uniform corrosion testing
4. One KSE3 fuel element for uniform corrosion testing
5. Two 23-inch NAEL fuel elements for support fatigue and fretting corrosion testing
6. Six coupon holders containing type 304 stainless steel and 70-30 copper-nickel alloy coupons for stress corrosion testing

DECLASSIFIED

DECLASSIFIED

HW-79060

TF-20 - Testing to determine the effects of heat transfer on aluminum corrosion in process water continued. Testing to determine the cause of resistance temperature detector corrosion and the effectiveness of various coatings was started. Operating conditions are 120 C and 5.5 gpm flow.

LEGEND

NIE1 - N Reactor, inner tube, enriched, first model
NAE1 - N Reactor, assembly - tube and tube, enriched, first model
NIN1 - N Reactor, inner tube, natural, first model
KSE3 - KER Loops, single tube, enriched, third model

O. H. Greager
Manager, Research and Engineering

FACILITIES ENGINEERING

DESIGN ENGINEERING

Vertical Safety Rods - Graphite Distortion

Following last month's successful installation of a polycrystalline graphite liner in VSR channel No. 28 at 105-C Reactor, the channel boring equipment is being decontaminated to permit continued developmental testing in the 195-D VSR test tower. The graphite reamer cutters are being modified to relieve binding tendencies, and the reamer is being reworked in an attempt to eliminate the oil leaks observed during on-reactor usage. Gas packed graphite bars are being obtained to permit the use of a harder graphite in future mock-up tests. The design of reamers for use in the 105-K Reactor VSR channels is under way.

Revised vendor proposals for the design, fabrication, and testing of shield boring equipment to enlarge VSR openings in the top thermal and biological shield of the K Reactors have been received. An engineering evaluation of the two proposals received has been completed; however, a determination has not yet been made regarding initiation of procurement. An investigation of methods and materials for calking reactor graphite stack voids and investigation of various alternative methods of providing supplemental reactor nuclear control have been initiated as part of an expansion of the scope of activity on this program.

Work is in progress on analytical studies dealing with forces on liners that might be installed in the VSR channels, which indicate that the major forces acting on the graphite stack are gravitational forces.

Testing of the new air and gas seals for the K Reactor installation of universal vertical safety rods has been completed. A labyrinth type seal using six felt Teflon impregnated washers has been found to be adequate for the air seal. The gas seals are an adaptation of a previous design and their performance has been satisfactory.

Flexible Horizontal Control Rods

The procurement contract for two prototype HCR tip assemblies has been forwarded to NTH Products for their acceptance. The expected delivery date of February or March 1964 will require rescheduling of certain portions of the HCR program.

Vitro Engineering has been requested to provide detailed design for the bearing assemblies for the out-of-reactor portion of the new HCR system.

Discussions have been held with the General Electric Company's Nuclear Materials and Propulsion Operation concerning their work on an uncooled control rod materials. Their work will involve producing samples of alternate high temperature control materials to determine control and physical strength.

DECLASSIFIED

HW-79070

105-K Reactor Zirconium Tube Program - Design

During a recent zirconium tube installation outage at 105-KW Reactor, leakage was experienced with the outlet nozzle assemblies. These problems were overcome at 105-KE Reactor through a minor design change and installation technique revisions. No further leakage was experienced.

Evaluation of Radioactive Materials Shipping Cask

A visit was made to Mound Laboratory and Savannah River Plant to obtain information concerning cask and material handling facilities and processes to assist in cask design analysis. Contacts were established for coordination of design with customer requirements. A visit was also made to the Advanced Technology Laboratory to discuss design concepts and determine the specialized assistance which could be offered in support of the planned cask design program.

Fire Detection and Sprinkler System - 1720-H

A recent fire prevention survey indicated the need for additional fire protection facilities in several locations. As part of this program, preliminary engineering has been started on the installation of a fire detection and sprinkler system for the 1720-H Building.

Process Piping System Studies

The program to assess process piping integrity has continued. Samples already removed from various locations are being machined for laboratory testing, and additional samples are being removed as outage time permits.

Hydrostatic testing of a section of a DR crossheader has been completed. Specimens failed at 5780 lbs/sq. inch at room temperature. Failure occurred at branch connection weld.

Procurement of material for repair of piping from which samples will be removed has run into difficulties. The vendor as yet has been unable to furnish certification that material will pass Charpy test. Alternate sources of material are being investigated.

K Bauxite Feed Facilities

The Design Criteria for Architect-Engineer use has been approved by RLOO-AEC and issued.

Emergency Storage Basin Cooling

The Design Criteria for Architect-Engineer use has been approved by RLOO-AEC and issued.

Reactor Power Recovery Studies

Approval has been received from [REDACTED] for the performance of a study of the feasibility of electrical power recovery from the existing Hanford reactors.

DECLASSIFIED

HW-79070

Initial work on this study is being directed toward the establishment of a technical basis for the work, the detailed planning of study performance and the accumulation of available background information. The initial parametric computer calculations to establish basic system parameters for the study cases are under way.

EQUIPMENT DEVELOPMENT105-K Reactor Zirconium Tube Program - Development

Redesign of the slip tube assembly on the K Reactor process channel boring machines has been completed. This redesign will eliminate the galling of the drive shaft encountered during the August outage at KW Reactor. Fabrication of the redesigned parts is under way and will be completed in time to permit testing prior to the next scheduled K Reactor outage.

Self-supported Fuel Element (SSFE) Charging

During the outage at KE Reactor a total of 834 zirconium process tubes were charged with self-supported fuel utilizing the Mark I and Mark II Union Machine Works charging machines. Two hundred and thirty-eight of the 834 tubes contained goal exposed, self-supported fuel elements, with the balance being newly installed zirconium tubes. Total elapsed time for charging of self-supported fuel elements was 49 hours. The 596 empty tubes were charged at an average rate of 35 tubes per hour. For the first time displacement discharging was successfully accomplished at ram forces of 3000 to 3500 pounds. Enriched self-supported fuel continues to require higher discharge forces than natural self-supported elements of comparable exposure. Several minor mechanical deficiencies were noted on the Mark II prototype charging machine and severely hampered the attainment of high charging rates. These deficiencies are being corrected in preparation for routine charging at subsequent outages.

A total of 300 magnesium magazines with plastic inserts were available and used during the outage. The revised method of gluing the plastic strips to the magazine appears to be successful as no strips were lost during charging of approximately 300 columns. Two plastic strips came loose from the magazines procured on the original order. One all-magnesium magazine was cycled three times through the charging operation with no discernible damage to the self-supported fuel elements. A purchase order for 400 prototype magnesium magazines was placed with the Dow Chemical Company on September 16, with delivery by January 1964.

Two prototype polystyrene magazines have been received from the General Electric Manufacturing Services. Fabrication of a support tray to permit testing of the magazines is in process. Additional plastic materials are being investigated as alternate compounds for all-plastic magazine fabrication. It has been concluded that an all-polystyrene magazine will not withstand mechanical damage experienced during fuel charging and handling.

Prototype High Speed Scanner

A total of 23,411 hours has been accumulated on the prototype equipment. No unusual incidents have occurred.

DECLASSIFIED

K Reactor Resistance Temperature Detector (RTD) Corrosion

Two hundred RTDs were removed from KW Reactor during the recent outage. These elements are being inspected and analyzed to determine the degree and location of corroded areas. Test installations in the KER Test Facilities were completed on September 6, and testing is in progress. Procurement of standard RTDs with vitreous ceramic coating over the stem was initiated on September 10; delivery of samples is promised by the end of October. Initial testing of the insulation resistance of silicone varnish-coated RTDs was completed and found to be low. Investigation is under way to determine if the cause of the low resistance is due to the method of application or is inherent in the coating.

Linear Rate-of-Rise Instrumentation

The Mark II prototype linear rate-of-rise instrumentation has completed 5500 hours of continuous operation with no component failures or degradation of performance. Selection of dual indicating meters required by the system continues to be a problem. One of the three meters obtained from Hickok Electrical Instrument Company was tested and found to have a sticking indicator hand. The instrument was returned to Hickok for rework per our purchase agreement. With the exception of the indicating meters, development is considered complete.

Intermediate Range Neutron Monitoring

The intermediate range nuclear monitor is a logarithmic, seven-decade, non-range changing, reactor flux level and period meter with high limit detectors operable from 0.00001% of full power to full power. It consists of a gamma compensated neutron sensitive ion chamber, a logarithmic nanoammeter, period meter, dual chamber polarizing supply, and high limit detectors for causing safety circuit action in the event the reactor flux level and/or period exceeds preset levels.

Several solid-state intermediate range nuclear monitoring systems were developed and tested on-reactor. Results of these on-reactor tests have shown an intermediate range nuclear monitoring concept to be sound and within the capabilities of the current state of the art of nuclear instrumentation. Currently the system hardware is being refined and complete system specifications written.

Design Test Service

The N-Reactor program utilized 655 hours of engineering effort for design test service.

DECLASSIFIED

DECLASSIFIED

HW-79070

PROJECT ENGINEERING

CGI-103, Fuel Element Charging and Handling System, KE and KW Reactors

The design schedule has been approved by the RLOO-AEC. Detailed design is currently 25% complete. The purchase order for the four new metal loading cranes has been placed. Orders have been placed for two prototype fuel magazine handling clips and for two prototype steel pallets. Bid closing date on the charging machine is September 27. The design criteria covering the work to be done by Vitro has been approved. Their estimate for the work covered in these criteria is \$8,000 and they have agreed to complete design within three months. This is ahead of the scheduled design completion date of January 15, 1964.

CGI-839, Modification of Fuel Element Test Facilities, 1706-KER

A drawing priority rating was set up for Vitro to follow in order that preparatory work can be completed when major equipment becomes available. Design completion date of February 1, 1964, remains unchanged.

The low bid of the General Nuclear Corporation to supply neutron detection systems has been determined to be satisfactory.

CAI-940, Installation of Oil-Burning Facilities in Lead Boiler, 184-H

A review of our design requirements has been made. It is felt that the new scope will allow performance of the work within authorized funds. Extension of time for performance will, however, be required. Vitro has been contacted. They have expressed a desire to undertake design. A criteria is being prepared.

CGI-960, "C" and "D" Work Platform Safety Improvements, All Reactors

Title II effort by the on-site Architect Engineer is approximately 97% complete. Revision 1 of the design criteria has been submitted for approval by the Commission. This revision incorporates deletion of platform and shaftway gate interlocks, reduction in height of platform and shaftway fencing, deletion of charge platform truss deflection alarm systems, retention of existing platform drive synchronization shafts, and elimination of the offset feature of these shafts. Bids have been received on all engineered equipment, and orders have been placed for auxiliary lighting fixtures, overload safety switches, and compressor units.

CGI-966, Safety Circuit Trip Identification System, 105-B, C, D, DR, F, H

Bids were opened September 18 for the last bid package consisting of the original required design Cypak specification and associated drawings. Low bid was \$64,950. This bidder took no exceptions to our invitation; consequently the Commission was advised September 24 to place the order.

[REDACTED]
DECLASSIFIED

HW-79070

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

Technical negotiations between Astrodata and HAP0 engineers took place September 18 and 19. The equipment specification was reviewed. Clarifications of the specification definitions and/or language were recorded in the minutes of this meeting and shall be included as an appendix in the specifications. A contract negotiation meeting was held concurrent with the technical negotiations on September 19. Astrodata provided their formal proposal September 30.

CGI-998, Improvements to Gamma Monitor Systems, 105-KE and KW

Design and procurement of engineered equipment continued. Preliminary field activity, directed at sample room piping pre-assembly, started on September 23.

MJA-47, Pressure Monitor Modification and Repair, 105-B, D, DR, and F

Small quantities of gages were received from the vendor and installed in 105-B and F. Status is as follows:

	<u>Installed</u>		<u>% Complete</u>
	<u>This Period</u>	<u>To Date</u>	
105-B	88	1126	56
105-D	--	936	47
105-DR	--	1310	65
105-F	<u>185</u>	<u>720</u>	<u>36</u>
	273	4092	51

AR-P-25041, Portable Closed Circuit Television Systems, All 105 Buildings

All equipment was received on September 25. Building installation will be made as on-site testing is completed.

100-K Zirconium Retubing Program

The quantity of zirconium tubes on order from Wolverine Tube was reduced from 5,200 plus 1% allowable overage to 5,100 plus or minus 50, with no effect on unit price. To date, 4,033 tubes have been received, with approximately 3,300 accepted after inspection at HAP0.

A total of 597 zirconium tubes and 22 aluminum tubes were installed during the recent 105-KE outage. The outage work, scheduled for completion at midnight September 8, was completed on day shift September 7. Total zirconium tubes installed to date are 1,154 at 105-KW and 1,165 at 105-KE.

Directives Received

AEC-216, Mod. No. 1, Fence Relocations, 100-B,D, and K Areas
(Interim authorization for K work)

EQT-003, Modifications for Use of Bauxite, KE and KW
(Interim authorization for design)

CPFF Construction Service Contractor-Liaison

Issued nine new work orders to the J. A. Jones Construction Company for a total of \$31,109.

Plant Forces Work Review

The Labor Standards Board approved one job for assignment to plant forces, estimated to cost \$1,475.

Manager, Facilities Engineering

RT Jessen:dgm

DECLASSIFIED

DECLASSIFIED

HW 79070

FINANCIAL

ACCOUNTING

The physical inventory of movable property and in-service spare equipment was completed and reconciled with accounting records.

Frozen lunches in all 100 area freezers were inventoried. In all locations, accounting records agreed with the physical count.

The 100-H processing essential material inventory was audited.

The contingency maintenance request for the F terminal board relocation job was submitted to RL00-AEC on September 3, 1963. Although this request and a separate letter to the Commission dated August 28 asked for approval on this job by October 1, 1963, RL00 had not replied by October 3.

AUDITING

Five IPD and sixteen HAPO OPGs were revised and issued.

BUSINESS AND INFORMATION SYSTEMS

A task force was set up in Production Fuels Section to determine the feasibility of using data collection equipment for use in their Preventive Maintenance program. The task force includes a representative from Maintenance, Plant Engineering, and Finance. They will determine the savings that may be expected from the availability of current equipment data in regard to maintenance.

Manager-Finance

RW McMichael:RET:slb

DECLASSIFIED

HW-79070

SIGNIFICANT REPORTS ISSUED

<u>Number</u>	<u>Class'n</u>	<u>Author</u>	<u>Date</u>	<u>Title</u>
HW-76391	Unclass.	VG Blanchette	6-20-63	A Study of the Independence and Reliability of the 165-K Building Generator Bus
HW-77557	Unclass.	JE Boyd	5-6-63	Project CGI-960, Representatives Meeting No. 3
HW-77847 Rev.	Unclass.	DF Watson	6-10-63	Project Representatives Meeting No. 4, Project CGI-905, Interim Modifications for Improved Coolant Backup, 100-B, C, D, DR, F, H
HW-77071	Unclass.	WR Thorson	8-23-63	Preliminary Engineering Report - Replacement and Improvement of Fixed Radiation Monitoring Instrumentation
HW-78665	Unclass.	GE Peck	8-16-63	Project Representatives Meeting No. 1, Project CGI-112, Increased Overflow Capacity for Metal Storage Basins - 105-KE, KW Buildings
HW-78184	Unclass.	DF Watson	7-11-63	Permanent Acid Feed Facilities for Low pH Control, 100 B, D, DR, F, H, and C Reactors
HW-78770	Secret	EL Etheridge	9-6-63	Design Criteria - Bauxite - Sulfuric Acid Feed Facilities - 100-K Area.
HW-77867	Unclass.	WR Thorson	8-23-63	Fixed Radiation Monitoring - Project Representatives Meeting No. 2
HW-78889	Conf. Undoc.	LB Brinkman	9-12-63	Design Criteria for Emergency Storage Basin Coolant
HW-78923	Unclass.	CE Bonham	9-16-63	Design Criteria for Miscellaneous Equipment and Facilities, Buildings 105-KE and KW, Project CGI-103 Fuel Element Charging and Handling System
--	Conf. Undoc.	LE Osteyee	9-3-63	High Speed Boring Test

<u>Number</u>	<u>Class'n</u>	<u>Author</u>	<u>Date</u>	<u>Title</u>
HW-78881	Unclass.	HC Copeland	9-11-63	184-D Boiler Performance Test of 11-16-62
HW-78900	None	MW Marusha	9-13-63	Ball 3X Lockbars and Reset Levers, 105-C
HW-78980	Unclass.	JR Young	9-20-63	Optimum Frequency of Tube Re- placement Outages, 100-B, C, D, DR, F, and H Reactors

DECLASSIFIED

DECLASSIFIED

HW-79070

Number	Class.	Author	Date	Title
HW-78788	Unclass.	WEE Lander	9-6-63	Design Test 1126 Final Report, Coextruded Carbon Steel to Zircaloy-2 Process Tube Joint
HW-77923 Sup.	Unclass.	M Pociluyko	9-10-63	Design Test 1160, N-Reactor Pressure Drop and Plugging Tests
---	Unclass.	PB McCarthy JA Dear	8-26-63	August Tube Outage SSFE Charging at KW Reactor
---	Unclass.	PB McCarthy JA Dear	9-9-63	SSFE Charging at KE Reactor After the September Zirconium Tube Outage
HW-78710	Unclass.	RE Daling	9-23-63	300 Area Master Plan
HW-77878	Unclass.	GR Hanson	6-20-63	Studies Regarding an Upsizing Process to Reclaim Self-Support Elements Rejected for Low-Rail Height
HW-78488	Secret	JT Stringer JW Riches JE Minor	9-9-63	Report to the Working Committee of the Fuel Element Development Committee from the GE Company - Hanford
HW-78777	Secret	HG Powers	8-28-63	Feasibility of the Use of Induction Heating Equipment for Pilot Plant Development Work
HW-78901	Secret	JJ Wick	9-2-63	Provisional Specifications for Prototypical Lithium-Aluminum Target Element 05T
HW-78786	None	RS Peterson	8-29-63	Development Test DT-JP-613-S Horizontal Control Rod - Coolant Hose Connector
HW-78786 Rev. 1	None	RS Peterson	9-25-63	Same as above.
HW-78790	Unclass.	TW Hauff	8-29-63	Hanford Water Treatment Process - Offsite Publicity
HW-78858	Unclass.	EJ O'Black	9-5-63	BPA Electrical Disturbance and Effect on IPD Equipment Operation
HW-78860	Unclass.	LD Gustafson	9-13-63	Evaluation of Corrosion in Reactor Water Plant Carbon Steel Piping and Tanks

TRIPS

<u>Name</u>	<u>Firm & Location</u>	<u>Date</u>	<u>Purpose</u>
WK Woods	AEC Germantown, Md.	9-4-63	Attend meeting of Industry Task Force on Hanford Diversification.
	Du Pont Savannah River, Ga.	9/5-6/63	Technical interchange on matters of reactor technology.
NT Hildreth	Chicago, Ill.	9/9-12/63	Attend ISA Meeting.
	Dresden Reactor Morris, Ill.	9/9-12/63	Discuss reactor instrumentation.
WK Woods	Washington, D.C.	9-19-63	Attend Nuclear Development Council Meeting.
	AEC Washington, D.C.	9-20-63	Discuss thorium technology.
R Nilson	AEC Germantown, Md.	9-25-63	Discuss production of U-233.
	San Francisco, Calif.	9/26-27/63	Attend ANS Meeting.
GE Peck	Mound Laboratory Miamisburg, Ohio Advanced Technology Laboratory (GE) Schenectady, N.Y.	9/8-13/63	To obtain information on material and cask handling, target element numbers and size and process information needed for cask design and HCR program.
CE Bonham	Union Machine Works Seattle, Wash.	9-19-63	To discuss technical requirements of crane and hoist assemblies for Project CGI-103.
DF Watson	General Electric Co. Picayune, Miss.	9/22-26/63	To discuss relocation of work assignment.
PB McCarthy	Union Machine Works Seattle, Wash.	8-22-63	Inspection of SSFE charging machine built under DDR-169.
	Union Machine Works Seattle, Wash.	8/22-28/63	Same.
JE Kaveckis	ISA Conference & Exhibit Chicago, Ill.	9/6-15/63	Contact exhibitors relative to items in current and future development assignments.

DECLASSIFIED

[REDACTED] **DECLASSIFIED**

HW-79070

Name	Firm & Location	Date	Purpose
RT Jaske	Bureau of Reclamation Grand Coulee Dam Grand Coulee, Wash.	9/5-6/63	Conduct measurements supporting river cooling program.
	Marshall Space Flight Center Huntsville, Ala.	9/16-18/63	Discuss criteria for potential establishment of booster testing on Hanford reservation.
	Vandenburg Air Force Base Santa Maria, Calif.	9/19-21/63	Same.
LL Samford	ALCOA Seattle, Wash.	9-20-63	Discuss aluminum caps & cans.
LL Samford	Conrad Corporation Tacoma, Wash.	9-20-63	Discuss steel sleeves.
WF Emery	Ind. Ventilation Conference Seattle, Wash.	9/23-25/63	To attend conference on latest ventilation techniques.
RD Spice	National Lead Co. Cincinnati, Ohio	9/10-14/63	Implementation of grain size standards.
RD Spice	Instrument Society of America Annual Conv. Chicago, Ill.	9/8-9/63	Attend convention to obtain information on latest developments in instrumentation.
RL Roske	Renton Coil Spring Co. Seattle, Wash. & Future Products Co. Portland, Oregon	9/8-10/63	Inspect equipment used in fabrication of self-support rails for K5 fuels.
RC Stinson	American Nuclear Society Meeting San Francisco, Calif.	9/26-27/63	Attended American Nuclear Society Meeting on Nuclear Performance of Power Reactor Cores.
GF Quackenbush	New York, N.Y.	9/16-19/63	Attended as a Committee member, Meeting No. 19, on Nuclear Piping.
JW Green	Chicago, Ill.	8/12-16/63	Attended ISA National Conference. Also visited Continental Sensing Co. and Panellit Inc.

HW-79070

<u>Name</u>	<u>Firm & Location</u>	<u>Date</u>	<u>Purpose</u>
JJ Morris	Precision Instrument Co. Seattle, Wash.	9-24-63	Discuss blasting of steel surfaces for omega seal repair.

DECLASSIFIED

~~SECRET~~ DECLASSIFIED

HW-79070

VISITORS

<u>Name</u>	<u>Firm & Location</u>	<u>Date</u>	<u>Purpose</u>
W Baxter	Nuclear Materials & Propulsion Operation General Electric Co. Cincinnati, Ohio	9-13-63	To discuss work on uncooled control rod.
Dr. TJ Clark	Metallurgical Products Dept., General Electric Detroit, Mich.	9-13-63	To discuss work on pyrolytic graphite treated sleeves.
WF Rehmke	Union Machine Works Seattle, Wash.	9-12-63	To discuss charging machines fabricated by Union Machine Works under DDR-169.
JA Gilkey	Engelhard Industries Inc. Newark, New Jersey	9/5-6/63	Discuss gas problems and equipment.
JA McGurty W Baxter	Nuclear Materials & Propulsion Operation General Electric Co. Cincinnati, Ohio	9-13-63	Evaluation of materials suitable for control devices.
V Stein R Tollefson	Public Util. Director Public Util. Engineer Yakima, Wash.	9-19-63	Visit water treatment facilities.
RW Quick	Self (Consultant) Havertown, Pa.	9/23-27/63	Consult on export system.
AM Fine PS Olson	Atomics International Canoga Park, Calif.	9/25-27/63 9/26-27/63	Discuss current and future irradiation tests.
Y Hickey	Parker Aircraft Co. Seattle, Wash.	9-16-63	Discuss metallurgy of H fittings.
DM Guy	ALCOA Seattle, Wash.	9-25-63	Aluminum caps and can problems.
WP Buckley	ALCOA Seattle, Wash.	9-25-63	Aluminum caps and cans.
BG Craig	Electrical Products Cons. Spokane, Wash.	9-23-63	303 Safety Sign.

<u>Name</u>	<u>Firm & Location</u>	<u>Date</u>	<u>Purpose</u>
AW Niemer	Savannah River Lab. Aiken, S. C.	9-25-63	Discuss HDS Processing.
AL Fick	All State Welding Alloys, Inc. South Gate, Calif.	9-16-63	Discuss aluminum alloys and brazing fluxes which may be used in fabrication of self-support development.

DECLASSIFIED

END

DATE
FILMED

2/10/93