DECLASSIFIED

This document consists of
64 pages.

HW--77499

DE93 003957

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.

IRRADIATION PROCESSING DEPARTMENT
MONTHLY REPORT
APRIL, 1963

Compiled by
IPD Personnel
May 13, 1963

RICHLAND, WASHINGTON

DECLASSIFIED

By Authority of PR 24/CG-PR-2
DS Lewis 8-25-92
TL Phillips 10-1-92
DJ Krueger 10-05-92

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

Route To:	P.R. No.	Location	Files Route Date	Signature and Date
<i>J. E. Lewis R100-AEC</i>				

DECLASSIFIED

MASTER

DECLASSIFIED

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	C. E. Reed
21	300 Area Files
22	Records Center

DECLASSIFIED

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-5
<u>PRODUCTION FUELS</u>	
Manufacturing	C-1
Fuels Engineering	C-4
Quality Control	C-10
Plant Facilities	C-12
<u>RESEARCH AND ENGINEERING</u>	
Process and Reactor Development	D-1
Process Technology	D-6
Operational Physics	D-11
Testing	D-15
<u>FACILITIES ENGINEERING</u>	
Design Engineering	E-1
Equipment Development	E-3
Project Engineering	E-4
<u>FINANCIAL</u>	F-1
<u>REPORTS, TRIPS AND VISITORS</u>	G-1

SUMMARY

MANUFACTURING

Reactor MWD input production for April was 8.1% above forecast: 8.0% above at the six old reactors and 8.2% above at the K's. A new input production record for Hanford was again achieved exceeding last month's record by 1.7% and overrunning slightly the one-half million MWD mark.

Over-all time operated efficiency was 84.9% (81.4% forecast), the highest since December, 1960. The K Reactor T.O.E. was 85.7%, and 84.6% was attained at the six old reactors.

No new power level records were established during April. F Reactor achieved a new monthly input production record for that reactor, exceeding its April, 1961 record by 3.7%.

Four ruptured fuel elements, two I&E natural and two I&E enriched, were removed from the reactors. One natural metal failure (bumped) was at D Reactor; the other three were at B. One rupture occurred in metal designated for the unclassified plutonium program.

One rear Van Stone flange leak and one internal tube leak were corrected, both at D Reactor. There were no tube replacement outages in April.

PRODUCTION FUELS

A total of 627 tons of natural and enriched fuel elements was produced during April, 105% of the forecast.

Production through the ALSi Shop was at the rate of nine canning lines per day for the month of April. Canning line operating efficiency was 98.6% for the month.

Bare core inventory is 1450 tons, a 2.7 months' supply. These figures do not include 180 tons of dingot material. Finished fuel inventories totaled 1266 tons, a 2.6 months' supply, not including 191 tons of dingot material.

Overbore fuel yields have been increased to 84% through process improvements and replacements of faulty electronic components in the braze closure integrity tester. Based on destructive examination of fuel element rejects, the tester was rejecting acceptable material prior to replacement of defective components.

A final shipment (461 pieces) of C Reactor enriched (0.94% U-235) fuel elements assembled by Sylcor under Contract DDR-149 was received. This increases the total pieces received for evaluation to 781.

DECLASSIFIED

DECLASSIFIED

HW-77499

Metallographic examination of fuel elements finished by hot die sizing has revealed the presence of large grains in the lateral cladding near the cap and base ends after end bonding. Reducing the amount of work on the cladding in these areas during die sizing significantly reduces grain growth. Further tests are being made to eliminate the problem before resuming the assembly of fuel elements for a preliminary irradiation test.

RESEARCH AND ENGINEERING

During April reactor power levels at B, C, DR and F Reactors were limited by tube outlet temperatures, at D and H Reactors by bulk outlet temperature, and at K Reactors by administrative limits.

Half-plant tests to provide data on aluminum corrosion and effluent activity for the long-term optimization of the coolant treatment process continued; these include a low alum test at F Reactor, a low pH test at D Reactor and a low pH - low dichromate test at C Reactor.

A proposal to reduce the pH of the coolant to 6.6 at all old reactors excepting one-half of D Reactor (which is operating on a test basis) has been sent to the AEC.

The Charles T. Main Company was consulted regarding the results of the export system tests conducted under PT IP-568-AI. Studies are also under way at Washington State University's Albrook Hydraulic Laboratory to confirm the export system flow capacity. Analyses of the data are continuing and an interim method of operation is to be established in May.

Hazards Summary Reports (Volume 3) for the six old reactors and for the K Reactors have been completed and published.

Operation of the 1706-KER recirculation loop facility continued in support of the NPR development program. Five 23-inch N inner fuel tubes continue in test in KER-1; the test of eight 17-inch N inner fuel tubes in KER-2 was completed and eight 12-inch enriched single-tube fuel elements charged; KER-3 was charged with thirteen 23-inch N fuel element assemblies; and the testing of fourteen 23-inch N fuel element assemblies in KER-4 continued.

FACILITIES ENGINEERING

A total of 1634 zirconium tubes for the K Reactors retubing program has been received; 700 of these have been Van Stoned and are ready for reactor installation. Quantities of all other materials and equipment sufficient for the anticipated May outage at the 105-KW Reactor are available.

Analysis of the data obtained during the April on-reactor test at the 105-KE Reactor confirms that for some unexplained reason, less than the predicted amount of graphite is being removed from Row 40 process tube channels. Additional study of available data is proceeding in an attempt to define the

reasons for this behavior. Test boring from other zones in the reactor indicates sufficient graphite removal is being obtained to meet stated design criteria.

The charging of self-supported fuel elements on an interim basis is continuing until an engineered system can be procured. Two of the prototype charging machines are on plant and are being utilized for training of Supplemental Crew personnel. The third machine, designed and fabricated by Union Machine Works, has been returned to the vendor for modifications. A second prototype of the Union Machine Works design will be procured to permit installation of an on-reactor two-machine prototypical system.

Shield penetration for VSR Channel #28 at the 105-C Reactor has not been completed. Reworking of the present cutter assembly to improve brazed bond of the carbide inserts has been completed and is expected to improve the cutter performance problem encountered during the initial on-reactor test last month.

Test and development work has been completed to evaluate alternative materials which are more stress corrosion resistant for use as Tru-Arc type snap rings on the rear gunbarrels at the K Reactors. The test results indicate that a heat treated Inconel ring will have adequate mechanical strength and a satisfactory degree of stress corrosion resistance. Specifications for the procurement of full reactor quantities of these rings are being prepared.

Two modified 275 HP canned rotor pumps for Project CGI-839 (Modification of Fuel Element Test Facilities, 1706-KER) were installed, permitting KER-3 to be restored to service.

Construction work started on April 1 for Project CGI-976 (Automatic Filter Backwash System, 183-DR Building).

RESPONSIBILITY

Effective April 15, 1963, S. H. Small, Manager of Finance, Irradiation Processing Department, was transferred to the position of Manager - Contract & Accounting Operation, HAPO. Effective the same date, C. E. Reed was appointed Acting Manager - Finance, IPD.

Effective April 1, 1963 in Manufacturing Section, the Applied Reactor Engineering Sub-section was reorganized. The Maintenance Engineering Units were realigned to include additional responsibilities and are now designated as Plant Engineering. The Special Outage Service Operation was transferred from Applied Reactor Engineering to H Reactor Sub-section.

DECLASSIFIED

DECLASSIFIED

HW-77499

FORCE SUMMARY

	<u>Exempt</u>	<u>Non- Exempt</u>	<u>Total</u>
General	6	2	8
Research and Engineering	84	56	140
Manufacturing	394	1444*	1838
Production Fuels	110	417	527
Facilities Engineering	87	38	125
Financial	<u>22</u>	<u>13</u>	<u>35</u>
TOTAL	703	1970	2673

*Includes 48 N Reactor replacement trainees.

SAFETY, SECURITY AND RADIATION EXPERIENCE

There were 127 medical treatment injuries, four security violations, and no disabling injuries. A maintenance craftsman received radiation exposure slightly in excess of operational control (Type B by AEC Standards) while assisting in the removal of a ruptured fuel element.

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

MANUFACTURING

PRODUCTION OPERATION

There were no discharge exposure adjustments initiated during April. The exposure of uranium discharged averaged less than the March value but was still somewhat high. Twenty-three per cent of the uranium discharged was in the unclassified plutonium range.

APRIL DISCHARGE EXPOSURE (MWD/T)

<u>Regular Uranium</u>		<u>Enriched Uranium</u>	
<u>6 Old</u>	<u>2 K's</u>	<u>6 Old</u>	<u>2 K's</u>
721	783	848	870

Rail and truck shipments of Essential Materials were as follows:

Carload shipments for IPD	-	402
Carload shipments for other Depts.	-	142
Truck shipments for IPD	-	<u>87</u>
Total		631

DECLASSIFIED

DECLASSIFIED

SECRET

HW-77499

MONTH	REACTOR OPERATION STATISTICS - PROCESSING										
	B	C	D	DR	F	H	KE	KW	TOTAL		
April, 1963											
INPUT PU (% OF FORECAST)	101.5	93.7	108.5	118.2	123.2	106.7	119.1	97.3	108.1		
TIME OPER. EFF. (% OVERALL)	78.0	76.5	84.5	87.7	94.2	86.8	93.0	78.4	84.9		
NEW TUBES INSTALLED	0	5	8	0	2	0	0	0	15		
WATER LEAKS - TUBE	0	0	1	0	0	0	0	0	1		
- VAN STONE	0	0	1	0	0	0	0	0	1		
FUEL ELEMENT RUPTURE	3	0	1	0	0	0	0	0	4		
HELIUM CONSUMED - M CU. FT.	910.4	812.0	891.0	254.4	436.3	401.0	295.7	266.7	4267.6		
UTILIZATION OF REACTOR OUTAGE HOURS											
	TOTAL HOURS						% OF TIME				
CHARGE - DISCHARGE	46.2	27.6	58.9	51.4	3.2	17.3	23.7	51.4	279.7	4.9	
RUPTURE REMOVAL	43.1		6.9			1.9			51.9	0.9	
WATER LEAK		56.1	21.0	5.2				51.5	133.8	2.3	
TUBE REPLACEMENT	12.2	44.4	15.6	30.1	3.3	27.4	16.8	5.1	154.9	2.7	
MAINTENANCE	18.3	32.5	7.4	1.6	6.6	44.0	3.8	36.5	150.7	2.6	
STANDARD CHECK	1.6		0.8		8.1	4.4		3.6	18.5	0.3	
PROTECTION TEST	35.7	3.6	1.0				0.5	4.8	45.6	0.8	
PREP WORK	1.3	5.0			18.1		5.6	2.7	18.1	0.3	
OT	158.4	169.2	111.6	88.3	41.5	95.0	50.4	155.6	870.0	15.1	
TOTAL											
REACTOR OPERATION STATISTICS - POWER											
RIVER WATER PUMPED - M GALS.	7543.2		7342.0		3711.2	4077.7	9001.5	8249.3	39924.9		
WATER TREATED - M GALS.	3076.1	3868.3	4363.5	2848.0	3671.8	3937.2	8955.2	8249.3	38969.4		
WATER TO REACTOR - GPM NOR.	89100	97600	87500	86500	88500	82600	205000	205500	942300		
FINISHED WATER - ANALYTICAL DATA											
TURBIDITY PPM AVG.	.002	.003	.004	.004	.004	.003	.004	.004			
PH AVG.	6.90	6.60	6.95	6.96	6.91	6.90	6.60	6.61			
CL ₂ RESIDUAL PPM AVG.	.05	.05	.15	.15	.05	.10	.19	.20			
DICHROMATE PPM AVG.	0.98	1.38	1.98	0.98	1.00	1.00	1.72	1.74			
STEAM GENERATED M LBS.	59976		66845		37900	41725	27010	25692			
EVAPORATION RATE/LB. OF COAL	7.79		8.45		8.53	9.78	112.3	104.5			
EVAPORATION RATE/GAL. OF OIL											
TOTAL KW - HR GENERATED							1579200	1624000	3203200		

SECRET

B-C REACTOR OPERATION

Three outages at B Reactor were caused by fuel element failures, two of which were enriched and one a natural fuel element. Each failure required the removal of the process tube.

C Reactor experienced three significant outages: one outage was a continuation of the March tube replacement shutdown; a second was because of insufficient reactivity following a tube leak outage; and a third from an unsuccessful attempt to recover from a Panellit gauge trip. With the retubing of five problem channels, C Reactor now has no air channels except those required for graphite stringers.

An electronic secretary which will record Columbia River information from Priest Rapids for timely transmission to reactor areas was placed in service at Building 183-B. On April 29, the discharge valve bonnet on the No. 1 backwash pump failed. The bonnet, stem and gate were removed, a blank installed, and the backwash system returned to service in time to prevent shutdown of B Reactor.

An AEC Type B radiation exposure (exposure greater than 3 rem in a calendar quarter) was experienced when a maintenance employee received an accidental exposure of 5 rem for the period March 22 through April 17, 1963.

D-DR REACTOR OPERATION

D Reactor experienced three shutdowns. The causes of these outages were failure of a fuel element, process tube water leaks, and a wiring error in a Panellit gauge. DR Reactor had two shutdowns, a scheduled outage for charge-discharge and a brief unscheduled Panellit trip outage.

An electrical power surge on the BPA system was noted on April 9, but was of insufficient magnitude to cause interruption of electrically operated equipment.

An improved recorder was installed in the D Reactor moisture monitoring system. The new recorder is designed to improve the ability to locate leaking process tubes.

Relocation of service piping on the DR Reactor front face work platform was completed in accordance with Design Change 716 D-DR. This change was made to increase clearance between the platform structure and the process tube nozzles.

F REACTOR OPERATION

A monthly production record was achieved during April, exceeding the previous high established during April of 1961 by 3.7 per cent.

DECLASSIFIED

DECLASSIFIED

HW-77499

Two unscheduled outages occurred during the month. The first was caused by an unexplained Panellit scram and the second by a leaking spline seal which resulted in a Panellit scram during a flux traverse operation. The reactor was also down for one hour at the start of the month as part of a scheduled March outage.

Water removal from the reactor atmosphere by the dryers continues to be less than two gallons per day during equilibrium levels.

Failure of one of the two electrical coils in the master control of the 190 Building emergency turbine caused the pumps to accelerate. However, no loss of production or damage to equipment was encountered. To prevent a recurrence, the 115-volt coils in both solenoid valves were replaced with 125-volt coils.

Maintenance activities included the installation of 77 bumper fuel nozzles (program 82% complete), and 166 new Panellit gauges with front adjustments, as well as the overhaul of two vertical safety rod clutches (59% complete). In addition, two process tubes were replaced, adjustments to the slack chain limit switches on the discharge work platform were made, and all horizontal control rod brakes were adjusted. Also, the three-inch filtered water lines from the 105 Building work area to the sample rooms were replaced because of deterioration.

H REACTOR OPERATION

An unscheduled outage due to a ruptured fuel element tube leak was in progress at the beginning of the month. Reactor operation was maintained for a 26-day period until a scheduled shutdown for E-N block discharge and major maintenance.

Internal decontamination of the reactor rear risers, the bottom six rows of rear face hardware, and external decontamination of the rear face hardware were carried out in preparation for work by Minor Construction forces to install expansion joints in the rear face crossheaders (MJA-53). Radiation levels were reduced by a factor of four by the effort. The work was 60 per cent complete and remained in progress at month's end.

Wall thickness of 425 process tubes was checked by the probolog method to provide tube corrosion data.

The channel of vertical safety rod No. 22 was cleared of a graphite obstruction. The program of change-out of rod winch drives with overhauled units was continued along with adjustments to the hydraulic brake equipment and limit switches. Inflatable pressure seals were installed on horizontal control rods No. 13 and No. 14.

During the scheduled outage, maintenance work on power associated equipment included inspection of the No. 1 and No. 4 annex pump units and the No. 1 flywheel, inspection of 24-inch process header screens, installation of a new tube bundle in the deaerating heater vent condenser, inspection of clear wells and flumes, installation of an acid injection line in the

filter effluent flume, installation of backwash valves and repair of the west raw water cone valve.

KE-KW REACTOR OPERATION

A Panellit trip at equilibrium operation attributed to a system short caused an unscheduled outage at KE Reactor. In addition, operating continuity was interrupted twice briefly by Panellit scrams during nonequilibrium operation following start-up.

KW Reactor experienced three outages which resulted in significant outage time. One was a planned shutdown for metal processing, one was required to locate and correct a water leak and the other was caused by failure of the No. 3 low-lift pump motor at 190-KW. In the latter incident, examination of the motor indicated the failure was caused by rubbing of the rotor and stator.

During the outage at KW Reactor to locate the water leak source, a total of 950 process tubes in the top far quadrant was hydrostatically leak tested. No water leaks were detected. Side-to-side test holes were similarly tested and a leak in 3-A test hole was confirmed. To correct the condition, the test tube was removed and buried prior to reactor start-up. In the ensuing operating period, sporadic indications of another smaller water leak appeared in the same far top quadrant area of the reactor. A subsequent outage provided an opportunity to hydrostatically test the remaining side-to-side test holes (eight total), five front-to-rear test channels, and all top far thermal shield tubes. No leak indications were noted. An increase in water leak rate appeared at month's end. Plans were made to conduct additional tests during the retubing outage scheduled for May.

Installation of piping to provide process water backup to the bottom thermal shield (Design Change 682) was completed at KW Reactor. This modification eliminates the need for reliance on rear riser effluent water as a coolant or backup. A total of 20 mattress plates, deteriorated by impact and irradiation damage from fuel elements, was replaced at KW Reactor.

APPLIED REACTOR ENGINEERING

MAINTENANCE PRACTICES

The reporting of the R value (tube examination to establish in-pile characteristics and specify in-pile locations) for new aluminum tubes is being discontinued because of the consistency of tube quality.

Five horizontal control rods, which were fabricated locally from surplus materials, were delivered to spare parts. Two of these were recently installed - one in DR and one in H. It is believed that a number of in-pile rods are questionable as to life expectancy since the rods that have been hardness tested showed varying degrees of annealing. A purchase requisition for 16 horizontal control rods is now being reviewed by RLOO-AEC.

DECLASSIFIED

DECLASSIFIED

HW-77499

The current status for Equipment Maintenance Standards is as follows:

a. Issued	- 29
b. Being routed for approval	- 20
c. Out for plant comment	- 24
d. Waiting for multilith typing	- 32
e. In first-draft stage	- <u>37</u>

Total 142

PLANT EQUIPMENT ENGINEERING

Three gunbarrel bellows which were repaired by injection of silicone foam in 1960 were removed intact from the rear face of C Reactor for evaluation. Two of the bellows had been inadequately filled with foam. The material in the properly foamed bellows was only slightly harder than new material, showed evidence of some outgassing and some compression set, but would still make an effective gas seal. This examination was documented in HW-76893, Supplement A.

Document HW-77252 was issued to summarize current knowledge of the effects of 6.6 pH water on carbon steel piping in reactor water plants. Material covered included recent observations of water plant corrosion, results of investigations conducted both on and off plant, and suggestions for additional work to supplement that already under way.

PLANT ENGINEERING

No. 3 Low-Lift Motor Failure - 190-KW Building

Engineering assistance was provided for determining the cause of the No. 3 low-lift pump motor failure on April 16. This motor tripped off by operation of LRT relays (winding temperature) after sparks and smoke were noticed coming from the motor exhaust ducts. This failure was caused by the rotor rubbing the stator. This type of failure has occurred with two other units since the uprating of these motors from 900 HP to 1500 HP. This motor was sent to the Westinghouse shops at Sunnyvale, California for inspection and repair.

VSR Channel Work - 105-KE Building

Mechanical engineering assistance was provided for the removal of a graphite channel obstruction from channel No. 63.

Seismoscope Revisions

The seismoscope trip setting in 105-B was changed from 5 mm to 4 mm. The remaining areas are scheduled for this change by mid-May with engineering assistance provided by Plant Engineering - Instruments.

pH Measurement - Process Water

Design is complete, and appropriate design changes have been issued to change the range on the pH meters at B, C, D, DR, and F Areas to 6-8 pH. An Appropriation Request (P-35045) has been approved to provide the necessary new pH meters for 100-H. The purpose of this work is to provide more accurate measurements and subsequent control of the pH during both the reduction period (to 6.6) and future operation.

High Tank Level Instrumentation - D, DR, F, and H

Procurement specifications are complete and out for bid. The Appropriation Request (P-35046, Supplement I) to procure and install new instruments has been routed for approval. This instrumentation will replace the present system which is obsolete and unreliable.

Flushing Console Machines for Process Tube Flushing

The new flushing consoles have been installed in all reactors except the K's with good operating results to date. This flushing console provides a higher initial force to unseat the metal charge and results in a more positive flushing.

100 Area Interim Gas Leak Repair

The design package for repair of bellows leaks and interim repair of omega seals and neoprene seals has been prepared. This equipment will be utilized by Special Outage Services forces to perform mass foaming of the rear face gunbarrel bellows.

Audiographic Instruction Programs

Three programs listed below were completed during the month for a total of 40 programs available for use by reactor personnel:

- Rear Face Decontamination - 105-KE and KW
- Dummy Decontamination - 105-B, C, D, F, and H
- Operation of VSR Camera - 105-B and D

OC Schroeder
Manager, Manufacturing

OC Schroeder;DLD:bm

DECLASSIFIED

DECLASSIFIED

HW 77499

PRODUCTION FUELS

MANUFACTURING

Production

Yields and efficiency for April were as follows:

	<u>April</u>	<u>Forecast</u>	<u>Variance</u>
Eight-inch Regular	89.9	90%	-0.1%
Six-inch Regular	91.5	90%	+1.5%
Operating Efficiency	98.6	96%	+2.6%

Projection elements produced during April totaled 89 tons of six-inch material and 103 tons of eight-inch fuel. The yield on eight-inch self-support elements was 64 per cent and 71 per cent on six-inch self-support elements. The yield on eight-inch bumpered fuel was 84 per cent and 88 per cent on six-inch.

The welding yield on the self-support fuel was 85 per cent and 93 per cent on the bumpered fuel.

Projection production for April and to date is as follows:

	<u>April, 1963</u>		<u>To Date</u>	
	<u>Natural</u>	<u>Enriched</u>	<u>Natural</u>	<u>Enriched</u>
Tons produced	103	89	2152	1111
Finished Inventory	250	192	-	-

Canning line shifts operated during the month totaled 198.

Current Month's Production

Acceptable Fuel Elements (Tons)

<u>NATURAL</u>					<u>ENRICHED</u>					
<u>C</u>	<u>K</u>	<u>Reg.</u>	<u>Bumper</u>	<u>K5NS₁</u>	<u>C</u>	<u>K</u>	<u>Reg.</u>	<u>Bumper</u>	<u>K5ES</u>	<u>Total</u>
0.8	173.3	135.4	67.6	35.1	30.8	59.8	35.8	73.4	15.4	627.4

Per cent Of Forecast

0	96	111	161	82	0	122	119	70	53	105
---	----	-----	-----	----	---	-----	-----	----	----	-----

Manufacturing Yield

Current Month

0	90	90	84	64	92	92	89	88	71
---	----	----	----	----	----	----	----	----	----

Forecast

90	90	90	85	65	90	90	90	85	65
----	----	----	----	----	----	----	----	----	----

Previous Month

82	88	89	80	70	95	90	-	81	-
----	----	----	----	----	----	----	---	----	---

Inventories

Bare Core Inventory - 1450 Tons

Finished Fuel Inventory - 1266 Tons

Work In Process

At the end of April there were 168 tons of material in process.

Special Products

A total of 788 lithium-aluminum four-inch target elements for the H Reactor E-N loading was placed in storage during the month.

Lithium-aluminum target elements for the K Reactor E-N test load in the zirconium tubes were canned and self-supports attached during the month. The required lithium-aluminum elements for the K Reactor aluminum tubes were completed and shipped.

Scrap

Two shipments of scrap were made during April, totaling two tons of natural and 12 tons of enriched metal. One shipment of 300 empty boxes with lids was also made.

Fuel Recovery

In April the following fuel elements were processed through fuel recovery:

Eight-inch Regular - 22,766

Six-inch Watermix - 1,780

Six-inch Enriched - 7,616

Autoclave Failures

There were no autoclave failures during April.

Canning Jack Vibrators

Automatic oilers were installed on the canning jack vibrators during April. The automatic oilers maintain the vibrator frequency at a stable level thereby eliminating a variable in the canning operation.

Metal Additions to the Canning Pot

As a result of several months study, it has been determined that 13.5 per cent silicon metal for additions to the canning solution will maintain a more uniform silicon content in the canning bath than the 20 per cent silicon metal previously used.

DECLASSIFIED

DECLASSIFIED

HW 77499

Aluminum Can Problems

Two lots of aluminum cans were removed from the production stream. The first lot would not clean in the can-cleaning machine. The second lot was found to have an oversized spire well which prevented the cans from seating in the sleeves. The improper seating resulted in poor heat transfer into the base of the cans.

Nondestructive Testers

The nondestructive testers operated throughout the month without causing any lost time on the canning line.

Automatic Lathe Loader

During April, the lathe equipped with the prototype automatic loader was removed from service and in its place a lathe equipped with the production automatic loader unit was installed. The replacement of the lathe was accomplished with no lost time on the canning lines.

Operating Personnel

Effective April 29, the responsibility for operation of all nondestructive testers was assigned to the Quality Control Sub-Section. The AISI Shop transferred 11 Metal Fabricators to Quality Control to operate the testers. Over-all tester performance is expected to show substantial improvement as a result of designating direct responsibility for all phases of tester operation.

Maintenance Improvement Program

A work sampling study of the maintenance craftsmen in the 313 Building has been completed. The raw data has been sent to Data Processing for tabulation. The purpose of the study is to establish a base for performance measurement of the present organization and to determine the areas needing improvement.

FUELS ENGINEERINGRUPTURE EXPERIENCE

A total of four standard production fuel elements failed in the reactors during April, 1963.

<u>Fuel Element Type</u>	<u>Tube and Reactor</u>	<u>Exposure (MWD/T)</u>	<u>Rupture Classification</u>	<u>Failure Date</u>	<u>Canning Date</u>
Natural Non-Bumper	2681-B	551	*	4/16/63	7/31/62
Natural Bumper	0661-D	1062	Side Other	4/14/63	8/6/62
Enriched Non-Bumper	2774-B	485	Side Hot Spot	4/1/63	10/2/62
Enriched Non-Bumper	2490-B	699	Side Other	4/20/63	1/14/63

* Stuck in process tube and has not been removed.

No unusual rupture trends were indicated during the month. Only two enriched fuel element failures (mechanical damage and core split) occurred in the first cycle of the current H Reactor E-N loading, as compared to seven failures in the first cycle of a previous loading.

URANIUM TECHNOLOGYPhosphorous in Enriched Uranium

As a result of National Lead using a uranyl-ammonium-phosphate process to recycle enriched uranium scrap, starting in December, 1962, enriched cores have been contaminated with up to 150 ppm phosphorous. Although the effect of phosphorous above a normal content of less than 10 ppm on uranium behavior is unknown, it appears to be uniformly distributed in the as-cast ingots as uranium-phosphide (U_2P_3) in a eutectic structure. Hot working elongates the uranium-phosphides present, increasing the total stringer count over that of uncontaminated uranium. A 100 ppm limit has been established until the phosphorous content in the metal can be reduced. In the meantime, National Lead has been requested to determine the extent of phosphorous contamination in enriched feed material to modify scrap recycle process as required to control phosphorous content within normal range, and to defer any future process changes until the effects on uranium composition have been determined. Their present estimate indicates low phosphorous enriched cores will not be available for approximately three months.

X-Ray Diffraction Data

A computer program has been developed with which X-ray diffraction data on uranium cores can be graphically compared, in control chart fashion, with past HAP0 data. All new data on core samples will be routinely run to assess product uniformity. The program is designed so that the X-ray diffraction results for any specific core models, lot numbers, or special test material can be analyzed.

DECLASSIFIED

DECLASSIFIED

HW-77499

NONDESTRUCTIVE TEST MEASUREMENT ERROR

A report, HW-77165, "Economic Significance of Nondestructive Tester Measurement Errors," was issued. This report is a summation analysis of previous measurement error audit reports on AlSi Shop nondestructive testers and was issued to show status, emphasize the significance of trends in tester efficiency, and to make recommendations for improving the current measurement error.

ALTERNATE COMPONENT VENDOR EVALUATION

Data from a small controlled test, designed to compare canning performance of aluminum components from Vendor "C" and Vendor "A", were analyzed. The analysis did not reveal any differences except that test group "C" gave significantly better base end closure integrity, based on nondestructive test results, than control group "A". Further tests will be required to explain this difference.

IRRADIATION OF SUB-STANDARD FUEL ELEMENTS

Recent studies have indicated certain categories of fuel elements, which are either being routinely rejected or held in inventory because of sub-standard quality, can be irradiated in the upstream positions of the reactor process tubes with negligible rupture potential and substantial cost savings. Therefore, with the concurrence of Manufacturing and Research and Engineering, it is planned to utilize fuel elements rejected for surface stains, minor inclusions, and marred surfaces less than 10 mils in depth in the first five upstream positions as Phase I of a longer term fuel grading program. This will result in an estimated annual fuel fabrication cost savings of about \$140,000. An additional savings of about \$57,000 will result from the use of sub-standard material held in inventory in the upstream positions.

As Phase II of this program, a comprehensive study (HW-77367) has been made of all fuel reject categories with respect to rupture potential and possible irradiation in the first five upstream positions. Use of the additional reject categories proposed in this study will result in a total (Phase I and II) estimated annual savings of approximately \$336,000 in fuel fabrication costs and about \$247,000 in feed material costs. Since all of these fuel elements would be expected to perform satisfactorily, providing the closures and cladding are free of defects that might permit coolant entry, successful use of the material in the reactors will depend largely on identification and charging of the pieces in the proper positions. Both a permanent identification stamp on the base end of each fuel element and a fuel color scheme is proposed to assure proper charging.

For the longer term program, it is proposed to grade fuel elements on a quality attributes and variables basis in order to provide premium grade material for charging in positions of maximum irradiation severity and fuel rupture potential. Improvements in nondestructive testing equipment will be required before this grading can be achieved.

ALSI PROCESS DEVELOPMENT

The current overbore fuel element yield was increased to 84 per cent. Faulty electronic components and adjustments not normally or easily made were found to be the cause of the recent high UT-4 braze closure integrity tester reject rates. One half of the fuel elements previously rejected were acceptable after the malfunctioning features of the tester were corrected. Destructive examination of both acceptable and reject pieces verified tester capability. Overbore process improvements developed during the investigation of low yields included improved component cleaning, more optimum canning cycle times and techniques, and improved pressure quenching procedures. The inventory of overbore fuel elements has now been established at nearly the required level.

Adoption of integral spire-can components for the assembly of fuel elements by the ALSi process requires the ability to uniformly preheat the spires. Induction heating has been demonstrated as feasible technique and a suitable induction coil has been developed. Experimental casting of the coil in ceramic material for protection against ALSi has proven successful.

A study has been conducted in the ALSi Shop to determine the cost incentive for developing an induction heating technique to recover fuel elements from stuck sleeves. The average number of stuck sleeve rejects for the last three months has been 27 pieces per day, which results in a direct labor and material loss of about \$10,000 per year. On this basis, development of a recovery process appears justified and feasibility studies are underway.

During the reporting period, 837 overbore fuel elements were assembled in the 306 Pilot Plant. Of these, 697 were for production. In addition, 7313 weld rejects were reclaimed. Because of necessary building roof repairs, this facility was shut down two weeks.

ALTERNATE PROCESS DEVELOPMENT

Hot Press

The final shipment of C Reactor enriched (.94 per cent) hot press fuel elements fabricated by Sylcor under contract DDR 149 was received, increasing the total pieces received for evaluation to 781. Nondestructive and destructive testing of this material is being delayed pending the completion of higher priority work on hot die sized fuel elements.

Hot Die Sizing

Evaluation of the end bonding test run last month using differential thermal expansion dies is nearing completion. Process variables tested were:

DECLASSIFIED

DECLASSIFIED

HW-77499

Die Temperature*	610, 640, 670 C
Pressure	3, 4, and 5 tons/in. ²
Press Time	2.5, 3.5, and 4.5 minutes

*Test pieces were fitted with dies and preheated for five minutes to approximately 400 C in an air atmosphere resistance furnace set at 680 C.

The following is a summary of conclusions reached:

- 1) External bond strength on the lateral surface under the end bonding dies maximizes at high time, temperature, and pressure.
- 2) External bond strength adjacent to the dies maximizes at low time and pressure.
- 3) Nondestructive bond tests did not detect any difference in end bond quality throughout the range of variables investigated.
- 4) End bonding was achieved uniformly by Al-Ni diffusion at the higher times and temperatures, but little or no diffusion was observed at low time and temperature.
- 5) Intimate contact between the end cap and core was obtained over the entire pressure range.
- 6) Time and pressure had the following significant effects on external fuel dimensions:
 - a) Maximum external diameter increased with pressure while the minimum center diameter decreased with time.
 - b) Ellipticity at the center increased with time.
 - c) Warp increased from a minimum of 3.0 mils to a maximum of 6.0 mils over the time and pressure range tested.
- 7) None of the variables affected the internal diameter.

Metallographic examination revealed the presence of large grains in the aluminum cladding at both the cap and base ends of the finished fuel elements. Although the grain growth actually occurs during end bonding, it is believed to result from working the 8001 alloy in the critical stress range during sizing. Upon heating the fuel elements through the annealing temperature for end bonding, the large grains are produced. The large grains appear in narrow bands around the highly stressed regions in the cladding at the base end of the core and just above the core at the cap end. These grains are not as thick as the cladding, and are oriented three to four grains thick in a laminar structure.

During recent tests to determine the cause of grain growth, it was determined that annealing the as-received aluminum components prior to sizing reduces the amount of large grains observed on the surface after end bonding and micro-etching. Increasing the reduction ratio during sizing increased the area of large grains. Component design modifications to reduce work in the cap and base regions are expected to essentially eliminate grain growth.

Assembly of hot die sized fuel elements for a preliminary in-reactor test was initiated; however, this work was discontinued until the effects of the observed grain growth on fuel quality can be investigated. A total of 120 fuel elements was assembled using the following optimized process parameters:

Sizing

Preheat Furnace Temperature	680 $\pm$ 10 C
Preheat Time	12 $\pm$ 0.5 minutes
Wall Reduction Ratio	45 per cent
Ram Speed	70 $\pm$ 5 in./minute

End Bonding

Die Temperature*	640 $\pm$ 10 C
Pressure	4 $\pm$ 0.25 T/in. ²
Press Time	4 minutes $\pm$ 10 seconds

*Pieces fitted with differential thermal expansion dies preheat in an air atmosphere furnace for five minutes $\pm$ 10 seconds set at 680 C.

The end closures of ninety (90) fuel elements have been welded satisfactorily using standard welding procedures. These pieces are ready for nondestructive testing and ultrasonic support welding.

It was discovered that solvent could be used to clean hot die sized fuel elements. This method greatly simplifies former cleaning techniques using HNO₃-HF acid solutions.

Electroplating Nickel on Uranium

Studies of the electrolytic etching step in the electroplating process were continued. Investigation of the voltage and current characteristics of the anodic etch bath revealed the presence of alternating current in the direct current system. A wiring error in one of the direct current rectifiers caused this problem and was corrected.

Although tests have not clearly defined the interaction of all etch bath constituents, it tentatively appears that uranium concentration must be maintained at > 0.01 moles/liter to achieve uniform etching.

DECLASSIFIED

DECLASSIFIED

HW-77499

Anodic etch bath conditions that have been producing consistently satisfactory results are:

Etch for 6 minutes, 50 to 55 amps/ft.², at a temperature of 20-25 C.

<u>Bath Constituent</u>	<u>Present Composition (Excellent Results)</u>	<u>Previous Composition (Erratic Results)</u>
Cl ⁻	0.30 to 0.35 M	0.28 to 0.30 M
H ₃ PO ₄	5.5 to 6.0 M	5.2 to 5.6M
Uranium	0.05 to 0.10 M	0.0 to 0.05 M

The present bath composition has been employed on over 200 cores. Plate deposited on five per cent of the cores was tested in a 600 C air atmosphere for 20 minutes. Seven of the ten samples exhibited no plate defects and three each had a single small pore.

EQUIPMENT DESIGN AND DEVELOPMENT

Fuel Self-Support Program

Work was continued on an improved "T" section self-support rail design for the K-Reactor fuel models. Revised drawings were forwarded to the vendor with instructions to proceed on an order for 10,000 rails of this type. These rails will be produced from 8001 alloy plate stock, using four stage forging dies developed by the vendor. Delivery of "T" shaped wire stock to simplify the fabrication of "T" section rails is scheduled for delivery late in May.

Design criteria were issued for the off-site development of prototypic equipment to precisely measure and size rails on self-supported fuel models. The results of a consultation study leading to equipment recommendations for this purpose are expected from the vendor early next month. In the meantime, work is progressing locally on two new rail sizing concepts. An adjustable-relief plate type sizing unit has been assembled for testing. A powered roll unit is being fabricated.

Ultrasonic Welding Improvements

An extensive program has been developed to improve the ultrasonic rail welding process and equipment. The program is primarily directed toward minimizing rail weld rejects, and increasing welder operating efficiency and capability.

AlSi Reject Program

Design of a prototype automatic machine to apply silicate solution to the outer lip of aluminum can has been completed. The solution is applied to minimize AlSi slopover rejects.

QUALITY CONTROL

Yield Control

	<u>March Yield</u>	<u>April Yield</u>
8-inch I&E natural	88.0	89.9
6-inch I&E enriched	90.5	91.5
8-inch I&E bumpered	79.5	83.6
6-inch I&E bumpered	81.4	88.1
8-inch I&E self-supported	69.8	63.8
6-inch I&E self-supported	--	70.7

The over-all average yield for the month of April is up 2.9 per cent over that attained during March, 1963. The primary reason for this increased yield is better performance in the eight-inch elliptical bumpered and six-inch bumpered fuel elements.

The eight-inch self-support yield is down 6.0 per cent because of ultra-sonic welder rejects. The sizing and gaging operation is performing very well for self-support fuel elements with a yield through the station of between 96 and 97 per cent.

Dingot Uranium

Dingot uranium cores (104 tons) were canned this month for a canning yield of 89.8 per cent. This is the first dingot uranium canned since October, 1962. Dingot uranium canning was stopped in October after experiencing excessively high internal bond reject rates (greater than ten per cent) caused by fractured compound layers. The internal bonding layer was subsequently improved by modifying the duplex processing conditions and assuring that the duplex furnace agitators were turning during core submersion. The internal bond reject rate for the dingot cores canned this month was only 1.1 per cent. There are 170 tons of dingot cores on-site and 280 tons of dingot cores at the feed-sites that remain to be canned before the dingot canning program is completed.

Component Design

A revised can base and sleeve configuration, "stepped" base, was found to have a significantly better heating rate than the massive flat base design. In a test using the O size natural uranium self-support model, the temperature of the can base wall was 30 C higher at the end of the 47 seconds can-sleeve preheat for the stepped base design than for the flat base design. As a result of this test, 10,000 stepped base aluminum cans are being purchased for the O size self-support model. In addition, 3,000 stepped base O size natural uranium model cans are being purchased for comparison with the contoured base design used in this model. The stepped base sleeve will be easier and cheaper to fabricate than a contoured base sleeve.

Test quantities of modified steel sleeves with a different mouth geometry produced higher pressure-quench air pressures than regular sleeves. The

DECLASSIFIED

DECLASSIFIED

HW-77499

modified sleeve produces a better seal with the pressure bell than does the regular sleeve. A higher pressure is desirable for reducing void size. A better seal will prevent loss of molten AlSi from the cap end braze. Modified sleeves are being purchased for large scale evaluation.

Hanford Test Reactor

Forty-five per cent of the reactor operating time was utilized for special testing. The following services were provided:

1. Measured the relative blackness of one graphite K size bar for Materials Development Operation, Hanford Laboratories.
2. Measured relative blackness of 315 boron spline samples for Facilities Engineering Operation, Irradiation Processing Department.
3. Reactivity tested ten N reactor fuel assemblies and measured the relative value of each inner and outer element to the whole assembly.

Quality Control Standards

The Quality Control Standards relating to aluminum component cleaning and core recovery were revised during the reporting period.

1. Standard F205.0, "Aluminum Component Cleaning," was revised to require that the trichloroethylene vapors completely cover the components during the vapor degreasing operation.
2. Standard F602.0, "Compound Layer Removal - Caustic," was revised to extend the period of use of the sodium hydroxide solution when recovering natural uranium fuel elements. The longer use of this caustic solution will save \$4,000 per year in materials cost.

PLANT FACILITIES

Status of Active Construction Projects

CAF-954 - High Pressure Autoclave Development Facility

The design criteria have been approved by the customer organization. Problems relative to process feasibility are currently delaying further progress of this project.

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

The design criteria were approved by RLOO-AEC on April 23, 1963. Negotiations with an Architect-Engineer are currently under way by the AEC.

CAF-973 - Steam Distribution Line Modifications - 300 Area

Title II design work by Bovay Engineering is 95 per cent complete with a scheduled completion date of May 15, 1963.

CGF-979 - Pilot Scale Plating Equipment - 300 Area

A Work Authority issued to the General Electric Company on April 4, 1963, in the amount of \$150,000 authorizes the Company to perform Titles I, II, and III services, procurement, and other project related services. The equipment design specifications have been prepared and approved. Negotiation of a design and fabrication contract with equipment vendors is under way.

CAI-994 - Utilities Extension - 300 Area

This project was approved by RLOO-AEC and the authorization of funds is still pending the determination of whether it is to be funded from the FY-1963 or FY-1964 General Plant budget item.

CAI-997 - Boiler Replacement for Additional Steam Generating Capacity -
384 Building - 300 Area

The revised project proposal, which was forwarded to RLOO-AEC on March 8, 1963, was returned to the Company for further revision on April 11, 1963, due to budgetary considerations. This revision is scheduled to be forwarded to RLOO-AEC by June 1, 1963.

DECLASSIFIED

DECLASSIFIED

HW-77499

Utilities

Statistics

	<u>April</u>	<u>March</u>
Maximum steam generated (M lbs/hr)	96	115
Total steam generated (M lbs)	49,945	50,376
Total condensate return (M lbs)	15,159	19,873
Coal consumed (tons)	2,395.4	2,411.2
Evaporation rate	10.42	10.44
Efficiency - actual	81.4%	80.6%
Efficiency - optimum	86.0%	85.5%
Import sanitary water (M gals)	134.3	122.1
Peak water flow (gpm)	5,300	6,700
Peak water consumed in 24 hours (M gals)	5.1	4.9
Compressed air production (scfm)	51,799	47,457

The Consultant Contract (CA-381) with the Bailey Meter Company was completed. The final report on instrumentation at the powerhouse determined that the equipment was in good condition with further adjustments necessary on the stoker drives. All operating tests were completed and all steam flow and air flow meters were calibrated.

The installation of the motor control center in the 384 Building is complete.

The annual overhaul of No. 3 Boiler was completed and overhaul of No. 5 is now under way.

Two major leaks were discovered in the underground water line supplying the east high tank. These were not detected until the line was shut off as the water never surfaced but percolated down through the gravel subsoil.

Craft Training

Four hundred and nine manhours of training were given during the period of March 21, 1963, through April 20, 1963. Two training sessions for electricians on "lock and tags procedure" were conducted by a representative from Electrical Distribution, CPD.

Craft Services

Considerable craft assistance was provided to Hanford Laboratories during the shutdown of PRIR.

Improved planning and fabricating techniques have resulted in reduced costs for fabrication of the pallets for the new K fuel elements.

A localized storm on April 22, 1963, caused minor lightning damage. A motor on the heating and ventilating unit of the 3708 Building was burnt out and the motor starter of an air conditioner on the 3707-A Building was damaged sufficiently to require replacement. Total damage was estimated at about \$250.

Janitorial Service

The floor service crew was established April 15, 1963, and the regular janitorial runs were reduced from 27 to 23.

Mail Service

The work load in the mail room continues to be heavy. One additional Motor Messenger was added to help alleviate the situation.

WN Mobley
Manager - Production Fuels

WN Mobley:mj

DECLASSIFIED

DECLASSIFIED

HW-77499

RESEARCH AND ENGINEERING

PROCESS AND REACTOR DEVELOPMENT

REACTOR FUELS

The ten columns of self-support elements in KW Reactor authorized by Production Test IP-572-A have an average tube exposure of 600 MWD/T. The annular temperature relationship for the charges of this test, as monitored by thermocouple probes, has remained virtually unchanged during the irradiation period. The fuel charges with rail heights of current specifications continue to operate in the designed region of temperature unbalance, R values of 1.12.

On April 1, 1963, five fuel columns were charged by displacement discharge techniques into tubes which contained fuel elements at an average exposure of 410 MWD/T. Discharge forces for the five fuel columns were measured. The maximum observed forces were less than 425 pounds. Supports on charged pieces appear to have been damaged no more than if they had been charged into empty process tubes. Production tests, authorizing the charging of ten fuel columns by displacement discharging methods and the irradiation of ten fuel columns to about 120 per cent of normal goal, are being prepared. These authorizations will permit evaluation of discharge forces and self-support damage for the KVNS elements at planned maximum discharge exposures.

REACTOR ENGINEERING

Zircaloy-2 Process Tubes

Five tube channels were drilled at KE Reactor with the most recent boring bar design. The objective of this further test drilling was to define drill performance in the vicinity of row 40. Previous tests on row 40 at KW Reactor had indicated inadequate graphite removal in this region. Test results with the new bar were not completely satisfactory in that somewhat less than 100 mils of graphite was removed from the No. 5 trunion block instead of the 200 mils believed necessary. The inconsistency of drill performance in this area has not yet been explained. Graphite distortion measurements in this general area are consistent with the distortion predicted.

Corrosion

It has been recommended that the pH of the coolant at all of the old reactors except one-half of D Reactor, which is operating on a test basis at present, be reduced to 6.6. In view of a possible increase in the P₃₂ concentration in the reactor effluent, the concurrence of the Atomic Energy Commission has been requested.

The following half-plant tests to provide data for the long-term optimization of the coolant treatment process with respect to aluminum corrosion, effluent activity, and cost are underway. 1) Half-plant low alum test at F Reactor, 2) half-plant low pH test at D Reactor, and 3) half-plant low pH, low dichromate test at C Reactor.

STATUS REPORT OF PRODUCTION TESTS

Test No.	Type Metal	Tubes	Reactor	Goal		Remarks
				Exposure	Current Exposure	
IP-216-A	Normal prod. natural & enriched fuel elements	50	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 & 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-409-A	I&E self-supported fuel	2	KW	800 MWD/T	600 MWD/T	Provide qualitative data to confirm the fuel geometry design. Two columns discharged on 2-9-63.
IP-423-A	Oil-quenched natural uranium I&E fuel elements	150	F	Variable		Provide a comparison of dimensional stability of standard water-quenched uranium fuel cores and oil-quenched cores.
IP-572-A	I&E self-supported fuel	10	KW	Variable	600 MWD/T	Evaluation of effect on temperature distribution of eccentric placement of fuel elements in smooth process tubes.

HW-77499

DECLASSIFIED

Export System

Dr. George R. Rich of the Charles T. Main Co. has been consulted regarding the results of the export system tests conducted under Production Test IP-568-AI. Dr. Rich makes the following recommendations: 1) Further system testing should only be done after performing the necessary analyses and then in stepwise increases in the amount of flow cut-off with continuous operation of an export steam pump at the pumping area. 2) The 282, 200 Area reservoir valves should not be closed until the system has stabilized after loss of export electric pumping. 3) To improve system reliability, an export steam pump should be in continuous operation to provide export water to the 200 Areas. 4) Detailed test analysis and proposed operational schemes be reviewed by Dr. Rich.

Analyses of the test results are continuing and an interim method of operation will be established early in May.

Studies are underway to confirm the export system flow capacity at the Albrook Hydraulic Laboratory, Washington State University.

Hazards Summary Reports

Hazards Summary Reports, Volume 3 for the six old reactors and for the K Reactors have been completed and published.

REACTOR PHYSICSRecycle Program

The per cent of recycle fuel in the enriched fuel present in the reactors at the end of March and in the fuel discharge during March are given below.

Per Cent 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>
March 31 Status	98	100	100	99	100	99	100	100
March Discharge	100	a	100	99	a	100	100	100

a - no enriched fuel discharged during March.

Further information now available indicates that all E metal supplied to Hanford will be recycle material except in the unlikely event that return uranium from Hanford to the feed site becomes delayed. There are no present plans at the feed site to analyze for uranium-236.

Overbore Program

Natural uranium overbore fuel, which has undergone irradiation in the C Reactor overbore block of tubes, is being dissolved and analyzed at the Redox facility.

RADIOLOGICAL ENGINEERING

Radiation Control Experience

The following table summarizes the radiation exposure experience of critical IPD classifications through the first 12 weeks of the 1963 badge year:

Classification	Total Dose	No. of Employ- ees	Average Dose/ Employee	Extrapo- lated Year End Average	No. of Employ- ees over 3r Extrapolated Exposure
Radiation Monitors	56535 mr	79	716 mr	3104 mr	52
Processing Operators	160284	268	598	2592	83
Pipefitters	79741	130	613	2657	48
Millwrights	69204	107	647	2805	51

A D-DR Maintenance Pipefitter received exposure of about 5r during the fourth badge period of the year, primarily as the result of a Lapse of Radiation Control which occurred on April 17, 1963 at B Reactor. His exposure during the first three badge periods of the year was about 1r. He was involved in the removal of a rear process channel gunbarrel to facilitate the discharge of metal from a tube containing a ruptured slug. Unknown to the discharge area crew, the process tube had parted at the position of the end of the gunbarrel. The portion of the parted tube in the gunbarrel contained an irradiated fuel element. It had been knocked out almost free of the reactor. The pipefitter was removing a small knocker from the flanged end when the gunbarrel came all the way out. He maneuvered it by means of a rope looped over the work platform rail into the space between the rear face and the platform and dropped it down into the discharge basin. Others in the discharge area were at least 15 to 20 feet away at the time, and did not receive undue exposure. This is a Type B radiation exposure by AEC standards. It was formally investigated on April 19 for the report to be forwarded to the AEC.

Lapse of Radiation Control

Distribution by Reactor and Component

	B	C	D	DR	F	H	KE	KW	IPD Totals
Processing	1	0	1	2	0	3	0	1	8
Maintenance	2	0	2	0	0	0	0	0	4
Supplemental Crews	0	0	0	0	0	0	0	0	0
Applied Reactor Engr.	0	0	0	0	0	0	0	0	0
Research & Engineering	0	0	0	0	0	0	0	0	0
Facilities Engineering	0	0	0	0	0	0	0	0	0
Central Maintenance	0	0	0	0	0	0	0	0	0
Reactor Areas	0	0	0	0	1	0	0	0	1
Assigned Totals	2	0	2	2	1	3	0	1	11

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

DECLASSIFIED

DECLASSIFIED

HW-77499

Effluent Activity Data

Average concentrations of selected radionuclides from reactor effluent samples taken during March 1963 are reported below in units of 10⁻¹² curies/ml.

<u>Reactor</u>	<u>p32</u>	<u>As76</u>	<u>Zn65</u>	<u>Np239</u>	<u>Cr51</u>
B	4.8	66	3.7	100	210
C	8.1	92	6.4	85	500
D	5.1	60	*	120	350
DR	3.2	72	8.0	95	285
F	11.2	140	9.9	170	350
H	8.7	66	7.5	85	285
KE	11.8	120	8.8	140	375
KW	13.2	180	10.6	170	435

* No sample - reactor down for retubing.

The average concentrations of P32 and As76 in the reactor effluent are higher than last month. This is primarily attributable to the half-plant low alum test at F Reactor and to water treatment difficulties at the K Reactors which necessitated alum feed rates between 6 and 12 ppm.

PROCESS TECHNOLOGY OPERATIONREACTOR POWER LEVEL LIMITATIONS

During this report period, the primary limit to reactor power levels for B, C, DR, and F Reactors has been tube outlet temperature limits to control tube corrosion. D and H Reactors' power levels have been restricted by bulk outlet temperature limits. Power levels at the K Reactors are currently restricted by the AEC administrative limits.

PROCESS STANDARDSHW-46000 B, Process Standards - Reactor

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

Process Standard A-020 - "Tube Outlet Water Temperature Limits - TAI"

TAI limit requirements for smooth-bore and overbore process tubes were added to the standard and specified to be 92 per cent of the standard ribbed tube limits.

Process Standard A-020 - "Annulus Boiling Limit"

A new pressure drop curve was added which defines the pressure drop for dual and single temperature sensors in the rear fitting and permits a 1 C increase of the annulus boiling limit at C Reactor.

Process Standard A-030 - "Pressure Flow During Reactor Shutdown"

This revision authorized a reduction in coolant supply pressures following a helium leak check period. The reduced pressures are still sufficient to sweep out any steam formed during the leak check period. The former specification required full shutdown riser pressure to be supplied.

Process Standard A-050 - "Panellit System Control"

Panellit minimum operating pressure and minimum low-trip limits for overbore tubes plus high-trip limits for overbore and smooth-bore tubes were added to the standard.

Process Standard C-060 - "Vertical Rod Withdrawal"

This revision deleted permissive bypassing of the LX trip function of the seismoscope during a cold startup until 2 MW is reached.

Process Standard H-010 - "Storage and Handling of Unirradiated Enriched U-235 Slugs"

An extensive revision of this standard included these changes:

1. Addition of requirements on transporting enriched slugs between areas;

DECLASSIFIED

DECLASSIFIED

HW-77499

2. Addition of storage limits for experimental slugs containing up to five per cent U-235;
3. Restating storage limits for enriched slugs as a density limit;
4. Categorizing fuel by U-235 content for ease of reference.

HW-46000 D, Process Standards - Reactor

One revised standard was issued during the month. This was:

Process Standard A-030 - "Pressure - Flow During Reactor Shutdown"

The boiling suppression pressure table was expanded by including longer times after shutdown where ΔP pressures are sufficient for sweeping steam. The ΔP sweep-out pressures are primarily for use when restoring flow after a helium leak check period.

HW-46000 F, Process Standards - Reactor

One revised standard was issued during the month. This was:

Process Standard C-060 - "Vertical Rod Withdrawal"

Revision to this standard was identical to that for HW-46000 B, above.

HW-46000 K, Process Standards - Reactor

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

Process Standard A-021 - "Tube Outlet Water Temperature, Top-of-Annulus Boiling Limit"

This revision requires a manual #1 safety circuit trip if the TOA boiling limit is exceeded.

Data for smooth-bore tubes were added.

Process Standard A-050 - "Panellit System Control"

Panellit high trip requirements for smooth-bore tubes were added. All reference to special limits for five-pump operation was deleted since front crossheader pressures are above 325 psig during such operation.

Process Standard F-010 - "Process Materials"

This standard was completely rewritten to cover zirconium and aluminum process tubes, and all materials that may be used in the tubes. The materials that are specified include: various models of uranium slugs and water mixers; newly designed dummies for smooth-bore tubes, as well as currently used dummies; both nonproductive and productive type poison materials; chemicals

and miscellaneous materials.

Process Standard F-020 - "Make-Up of Tube Charges"

Specifications on make-up of charges for smooth-bore tubes were added. Several requirements were deleted since they are more appropriately covered in other standards. Front dummy charge specifications were added to augment Process Standard C-120, "Poison Splines," requirements.

Process Standard H-010 - "Storage and Handling of Unirradiated Enriched U-235 Slugs"

Revisions to this standard were identical to those for HW-46000 B, above.

HW-27155 Rev1, Process Standards - Water Plant

One revised standard was issued for this manual during the month. This was:

Process Standard 183-A-070 - "Chemical Additives"

This revision accomplished the following:

1. Included aluminum sulfate produced from raw bauxite as an authorized chemical additive;
2. Added sodium silicate as an approved chemical additive for corrosion inhibition;
3. Deleted Separan 2610 since it is no longer used;
4. Referenced materials by material code number as proposed in HW-76032.

PROCESS CHANGE AUTHORIZATIONS

Eight Process Change Authorizations were issued during the report period to permit temporary deviation from Process Standards - Reactor, HW-46000. These were:

PCA #3-25 - "Process Tube Dummy Charge - K Reactors"

This process change authorizes the use of tubular dummies not specified in Process Standards. No adverse effects on hydraulic characteristics of process tubes are expected. Economic benefits are the primary justification.

PCA #3-26 - "Oil Leaks - Last Ditch Diesel Pumps - K Reactors"

Oil leaks were detected in the diesel driven pump lubrication system which were considered sufficiently serious to warrant early correction. Authorization was given to remove one diesel pump from service for a period of eight hours provided a man was stationed to manually start any diesel that failed to start automatically.

DECLASSIFIED

PCA #3-27 - "Water Leak - C Reactor"

The water collection rate reached the standard's limit of 24 gallons per day at C Reactor. Since no changes in reactivity were noted and the inlet dew-points and H₂ content were not increasing, continued operation of the reactor was authorized.

PCA #3-28 - "Leaking Panellit Gauge Sensing Line - B Reactor"

Process Standards contain provisions for repair of plugged sensing lines. Identical provisions were specified in this PCA for repair of a leaking sensing line.

PCA #3-29 - "Top Thermal Shield Temperature, KE Reactor"

Thermocouples close to the graphite have a higher temperature than thermocouples close to shield cooling tubes, but the standards specify the same limiting temperature for each. This PCA permitted the hot thermocouple to exceed the limit by 30 C but required maintaining the cooler thermocouple's temperatures 50 C below the standard's limit.

PCA #3-30 - "Securing From Crossunder Line, Rear Cap Off - B Reactor"

This process change authorized closing the crossunder line valve while one tube was still uncapped on the rear. No detrimental effects would be expected from this condition.

PCA #3-31 - "Seismoscope Bypassing - 30 Minutes, D Reactor"

Authorization was given to bypass the seismoscope trip contacts in the #1 safety circuit to accomplish needed emergency repairs.

PCA #3-32 - "Removal of High Sensitivity Seismoscope - B Reactor"

This PCA is an extension of PCA #2-153 to allow additional time to restore the high sensitivity seismoscope to the annunciator circuit.

REACTOR AUDITS AND INSPECTION

One engineer audited conformance to Process Standards on all Processing Operations' shifts by making 15 inspections at each reactor during the report period.

RUPTURE EXPERIENCE

<u>Failure Date</u>	<u>Tube Number</u>	<u>Lot Number</u>	<u>Type of Material</u>	<u>Tube Power at Failure (kw)</u>	<u>Exposure MWD/T</u>	<u>Type of Failure</u>
4/1/63	2774-B	KY-292-A	I&E E (0.94%)	1168	485	Side Hot-Spot
4/14/63	0661-D	KZ-453-D	I&E NB	925	1062	Side-Other
4/16/63	2681-B	KZ-446-A	I&E N	1201	551	Unknown
4/20/63	2490-B	KY-895-B	I&E E (0.94%)	1183	699	Side-Other

Legend

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

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

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

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

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

Unknown - Failed piece could not be located or had not been examined at the time of writing.

DECLASSIFIED

DECLASSIFIED

HW-77499

OPERATIONAL PHYSICS OPERATION

PILE PHYSICS ASSISTANCE

Operation generally was characterized by long runs and high operating efficiency, as measured by effective central tubes, nonequilibrium losses, and time-operated efficiency. Maximum power levels at four of the reactors were restricted by individual tube temperatures, at two reactors by bulk outlet temperature, and at the K reactors by the total power administrative limit.

A reactivity loss of ~11 mk was observed following a rupture removal at the DR Reactor during which considerable water escaped into the graphite. The accompanying flux distortion and control shortage enforced an extended period of low level operation; complete drying out and normal operating level were attained about 48 hours later than during a normal startup.

A few scattered reactor component problems have required physics effort: routine control and safety system maintenance has directed increased attention to total control requirements; tube temperature recording equipment (Flexowriter) failure has enforced some conservative techniques; and there is still a problem of "no-go" spline caps (caps which will not permit spline passage) in some cases.

SUMMARY OF OPERATING DATA OF PHYSICS INTEREST
FOR THE MONTH OF APRIL, 1963

Reactor	B	C	D	DR	F	H	KE	KW
ECT in April (1)	1545	1635	1525**	1540	1500	1515	2470	2530
12-Month Average ECT	1502	1645	1485	1490	1485	1515	2490	2535
Equil. Scram Time (2)	20-25	20-25	15-20	15-22	15-18	28-30	20-25*	25-30*
Recording Period -								
From:	3-21	3-20	3-20	3-21	3-19	3-20	3-19	3-21
To:	4-18	4-19	4-20	4-18	4-18	4-19	4-17	4-19

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

**High power tubes were selected from the 25 highest temperature tubes.

- (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

HW-77499

B Reactor - J. R. Fredsall

Excellent flattening efficiency (up to three per cent higher than previous 12 months' average) and low nonequilibrium losses characterized operation during the month. There was one "core startup" which resulted in an estimated production gain of 2.7 hours (the "core" consists of a central block of 50 E metal tubes whose reactivity is available for partial xenon-override upon discharge of compensating splines. One rupture within the core marred the otherwise satisfactory month.

C Reactor - D. W. Constable

Flattening efficiency was about average during the month, whereas non-equilibrium losses were higher than normal (largely due to water leak and Flexowriter temperature recorder problems); operation following an exceptionally large discharge (~1050 tubes) was quite stable until continuity was interrupted by occurrence of the water leak and ensuing manual scram as tube temperatures approached TAI limits. The subsequent startup was followed by approximately ten days of "bulk-limited" operation terminated by a Panellit scram; seven hours after scram recovery the reactor was shut down due to distribution control limitations resulting in high tube temperatures.

D Reactor - D. G. Albertson

Operating efficiency in general was quite good, as measured by effective central tubes (ECT), nonequilibrium losses (NEL), and time operated efficiency (TOE); operation was continuous over 25 days of the report period. There were two instances of procedural breakdown (involving half-rod positioning and vertical safety rod tie-out during outage conditions) without adverse operating effect but with total control administration implications; increased training emphasis by the physicist has been initiated.

DR Reactor - S. M. Skidmore

Flattening efficiency was the highest for DR since mid 1961; however, high nonequilibrium losses detracted from the otherwise successful month. The high NEL was largely attributable to water which escaped into the graphite stack during a rupture removal and absorbed an estimated 11 mk of reactivity consequently enforcing an extended period of low level, "drying out" operation. Equilibrium level was achieved approximately 48 hours later than normal; with the slow and methodical power increase program which was followed temperature cycling was avoided.

F Reactor - A. W. Medcalf

Operation was relatively continuous during the report period. Flattening efficiency was about one per cent above average, and nonequilibrium losses were correspondingly low. An outage was caused by a scram which occurred during routine spline flux traversing (the actual cause was associated with the spline seal rather than the type of spline). Three PCCF tubes were returned to service as process tubes leaving only seven remaining in the pattern.

H Reactor - E. L. Conner

At the end of the report period operation had been continuous for over three weeks, with residual pile exposure at high level (85 MWD/tube); only one outage (unscheduled) interrupted operation during the report period. All three efficiency-standards - ECT, NEL, and TOE - reflected high over-all operating efficiency.

KE Reactor - L. L. Grumme

Despite several startups (one hot, three secondary cold, and two cold startups) and an unusually high residual exposure, operation was stable and efficient during the report period. Spline usage was still restricted to reactivity compensation rather than flux trimming because of continuing "no-go" spline-cap problems.

KW Reactor - R. A. Chitwood

Average ECT and low nonequilibrium losses characterized operation during the month. One of the reactor shutdowns was carried out because of a suspected tube leak; during the outage, it was found that the leak was actually in the cooling system of a test hole facility. Continuous maintenance has been quite effective in assuring that individual VSR drop times satisfy speed-of-control requirements; the maintenance program requires frequent rod tie-out during outages and thus some total control corrective measures.

PROCESS PHYSICS STUDIES

Safety Control Studies

Calculation of VSR system strengths in terms of compensating effect on uniform changes in lattice reactivity has been completed. These calculations, which are necessary in the evaluation of speed-of-control, will be listed in the Hazards Summary report.

Review of operating and safety-related reactivity coefficients and evaluations for fulfilling operating reactivity requirements in the K zirconium lattice are largely completed. Operating coefficients and enrichment needs are predicted not to change greatly between the aluminum and zirconium cases, but the total control calculations will be affected by the different sequence of events postulated in the two cases between melting temperature of the aluminum and that of uranium.

Work on hazards studies for the use of the xenon-override enrichment core has proceeded. Calculational results obtained by Reactor Physics Unit have indicated that speed-of-control considerations should not be limiting.

DECLASSIFIED

DECLASSIFIED

HW-77499

Control Efficiency Studies

The production test authorizing a 51-tube E-N block demonstration loading in one of the K reactors has been approved as PT IP-561-C; it is expected to be charged during the next month.

The supplement to PITA IP-22-C covering the next loading of the H Reactor E-N core has been approved and issued. The block discharge outage for the H load replacement is scheduled for late April and early May.

The renormalized and updated IPD production yield and quality prediction tables have now been issued as HW-50300-B, Revised.

The semi-annual report of reactivity-related operating efficiency factors for the latter half of 1962 was issued as HW-77341. Losses per startup during the first quarter of 1963 have averaged slightly less than during the comparable period of 1962.

The use of aluminum-clad sintered boron-aluminum splines was authorized by issue during the month of PITA IP-24-C. About 200 splines, half of them "black" and half of them "grey" with respect to neutron absorption properties, have been received. Collection of data from PITA IP-19, authorizing test scale use of grey and half splines, has been largely completed.

Documents describing the equipment bases for the automatic distribution control prototype test planned for D Reactor have been issued by Equipment Development Operation.

File Operator Training

The presentation of the lecture on Nuclear Particles was completed for the currently scheduled operator classes and the session on the Chain Reaction was commenced for the rotating shifts. These will be followed next month by the third session on The Effects of Operation on Reactivity Variables.

The three-session formal course, which is now available in audio and visual aids, will also be presented to the N Reactor trainees in the near future.

TESTING OPERATIONIRRADIATION TESTING OPERATION

Irradiations - Sample and experiment irradiations were handled as follows:

Reactor	Test Hole	Facility	Request Number	No. of Samples	Material - Purpose
KE	2D	Quickie	HAP0-184	22	Washington Designated Program
KW	2A	Quickie			
B		Process Tube	ORNL-184	36	Beryllium-nitride (carbon 14 production)
KW		Process Channel	HAP0-098	20	Graphite (burnout rate study)
KW	4B	Snout	NAA-115	3	Stainless steel (determination of flux perturbation of stainless steel)
KW	3A	General Purpose	HAP0-236	1	Zirconium (creep rate study)
KE	2A	General Purpose	HAP0-245	1	Zirconium (oxide electrical resistivity determination)
C	B	Bare Channel	HAP0-250	1	Ceramics (radiation stability of candidate rod liner materials)
KE	2D	Quickie	HAP0-252	7	Arsenic (tracer isotope production)
C	E	Bare Channel	HAP0-259	4	Hastelloy-Inconel (high temperature-fast neutron damage study)
KW	4B	Snout	HAP0-270	3	UO ₂ (crystal structure formation study)
DR		PCCF	HAP0-271	1	Depleted uranium (neptunium production)
F	E	Quickie	HAP0-219	1	Strontium (isotope production)
KW	3674 3865	General Purpose	HAP0-222	2	Uranium Swelling Program
		*Gamma	HAP0-171	2	Plastics and rubber (radiation damage study)
		Gamma		3	Adhesive (radiation damage study)
		Gamma		1	Gasket material (radiation damage study)

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

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

Reactor	Channel or Tube	Purpose
KE	Process channels 4065, 4085, 5568, 4561, 5075	Boring tool evaluation
KW	Thermocouple stringer channel RS-5	Maintenance support
B	Process channel 2681	Maintenance support
C	Vertical rod channel 54	Broaching tool evaluation

DECLASSIFIED

DECLASSIFIED

HW-77499

Vertical Boring

Tube Y-2 - KW	Up .12" at 10' since 10-62
	Down .55" at 24' since 10-62
Tube 4254 - F	No previous data
Tube 4293 - F	No previous data

H-1 Loop

The H-1 Loop facility has operated with coolant temperature less than 150 F since February 27 because of a leak in the primary coolant system. Corrosion studies in this loop have been terminated.

COMPONENT TESTING OPERATION

Irradiated IPD Fuel Element Examination - 105-C Facility

Examinations were completed on fuel elements from 65 tubes requiring 199.4 fuel examination units. Individual examinations completed were 7116.

<u>No. of Tubes</u>	<u>Production Test</u>
31	IP-216-A Evaluation of Normal Production I&E Fuel Element Performance
2	IP-381-A Irradiation of Oversize Fuel Elements in the C Reactor Overbored Process Channel Facility
14	IP-549-A Half-plant Low Alum Feed Water Treatment at F Reactor
17	IP-560-A Half-plant Low Dichromate - Low pH Water Treatment at C Reactor
1	Regular Metal - Rupture column

Irradiated NRD Fuel Examination - 105-KE Facility

Flux distribution measurements and visual examinations were made on eight NIEL fuel elements discharged from KER-2 on March 23.

Process Tube Corrosion Monitoring Program

<u>Reactor</u>	<u>Number of Tubes Probologged</u>	<u>Report No.</u>	<u>EW No.</u>
C	233	21	77146
KE	83	22	77162
F	215	23	77197
B	47	24	77204
KW	56	25	77215
D	71	26	77182
B	130	27	77371
C	46	28	77377

In-reactor measurements of 17 C Reactor process tubes were made with the sector probe.

Visual examination and actual measurements were completed on nine process tubes:

<u>Reactor</u>	<u>Number of Tubes</u>	<u>Reason Examined</u>
C	6	Evaluation of sector probe
KE	3	Suspect abnormal rib wear

Critical Reactor Component Examination

Seven outlet flanges from C Reactor were measured for Mechanical Development Operation. A detailed report has been issued.

Panellit System Programs

Gauges repaired, calibrated by Maintenance	-	149	
Gauges meeting calibration criteria	-	124	(83%)
-previous month	-		(68%)
In-board gauge reliability examination	-	462	
Gauges meeting examination criteria	-	456	(98%)
-previous month	-		(90%)
-average for past year	-		(94%)
Response time determination	-	462	
Gauges meeting response criteria	-	461	(99.7%)
-previous month	-		(100%)
-average for past year	-		(99.7%)
In-board Bourdon coil examination	-	460	
Non-leaking coils	-	459	(99.7%)
-average rate for past two years-	-		(99.8%)
Gauges receiving failure analysis	-	25	
2B-X1 switch examination	-	1326	
-acceptance rate	-		(88%)
-previous month	-		(85%)
Gauges received from vendor and examined	-	835	
-acceptance rate	-	761	(91%)
-previous month	-		(88%)

Gauges removed from panels to permit installation of new gauges, and prepared for shipment to the vendor as exchange gauges totaled 640.

COOLANT TESTING OPERATION

KER Loop Operation

KER-1 - Testing of five 23-inch NIEL fuel elements as authorized by PT IP-536-A, Supplement C continued. The objective of the test is to evaluate ammonium hydroxide as a substitute for lithium hydroxide for pH control.

KER-2 - Eight 17-inch NIEL fuel elements with modified end closures were discharged during the March 26 outage. Eight 12-inch KSE5 fuel elements were charged as authorized by PT IP-544-A. The objective of the test is to evaluate the swelling behavior of fuel elements at high uranium temperatures.

KER-3 - Thirteen 23-inch NAEI fuel elements were charged on April 11 as authorized by PT IP-477-A. The objective of the test is to evaluate the irradiation behavior of N Reactor fuel elements at conditions equivalent to or more severe than those expected at N Reactor.

KER-4 - Testing of fourteen 23-inch NAEI fuel elements as authorized by PT IP-477-A continued. The objective of the test is to evaluate the irradiation behavior of N Reactor fuel elements at conditions equivalent to or more severe than those expected at N Reactor. The loop was placed on single-pass operation on April 11 because of failure of primary pump switchgear.

1706-KE Single-Pass Tube Operation

<u>Tube (KE Reactor)</u>	<u>Production Test</u>	<u>Water Supplied</u>	<u>Corrosion Inhibitor</u>	<u>pH</u>
SP-1 (2952)	IP-476-AL	Process*	1.8 ppm dichromate	6.6
SP-2 (3050)	IP-524-AL	Process	1.8 ppm dichromate	6.6
SP-3 (4355)	IP-520-A	Pilot plant	1.8 ppm dichromate	7.0**
SP-4 (4456)	IP-520-A	Pilot plant	1.8 ppm dichromate	7.0**
SP-5 (4557)	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-541-A	Deionized (Zr-2 clad fuel elements)		
SP-8 (5063)	IP-541-A	Deionized (Zr-2 clad fuel elements)		

*Changed from deionized to process water supply on March 26

**Water treatment pilot plant changed from pH 6.6 to pH 7.0 April 2

KE Reactor Outage Time Requirements

One unscheduled reactor shutdown was charged to production testing. The KE Reactor was shut down for 0.4 hour on March 29 because of probable impending failure of the motor-generator set supplying power to the KER loop instrumentation. A total of 7.1 outage hours was charged to production tests as listed below.

<u>Production Test</u>	<u>Description</u>	<u>Hours</u>
IP-476-AL	Charge-discharge SP-1 and four surrounding tubes. Repair SP-1 inlet venturi.	2.8
IP-477-A	Charge KER-3	0.5
IP-536-A	Repair KER-1 front nozzle leak and discharge KER-2	3.1
	Reactor shut down	0.4
IP-544-A	Charge KER-2	0.3

Out-of-Reactor Facility Operation

TF-1 - Decontamination testing to determine the effect of extended decontamination solution times and extended periods of high temperature operation on various decontamination processes continued. Operating conditions are 270 C, 1700 psi and pH 10.0.

TF-2 - The test to investigate the use of spring-loading to reduce the impact corrosion of Zircaloy-2 was completed.

TF-3 - The test to evaluate the effect of nucleate boiling in a crevice obtained by welding an NPR support on the surface of a heater element was completed.

TF-4 - Cyclic decontamination testing to evaluate single-step carbon steel decontamination procedures utilizing ammonium citrate was continued. Normal operating conditions are 300 C, 1650 psi and pH 10.0.

TF-5 - The test to evaluate the corrosion inhibiting characteristics of ammonium hydroxide as compared to those of lithium hydroxide in a carbon steel system was completed.

Testing to determine the corrosion rates of carbon steel and stainless steel in water containing 30 to 70 cc/liter hydrogen was started. The operating conditions are 290 C, 1400 psi and pH 10.0.

TF-7 - The test to evaluate the integrity of mechanical seals on special Zircaloy-2 capsules was completed.

A new test was started for the primary purpose of further evaluating fretting corrosion of various materials. The operating conditions are 530 F, 1125 psi and pH 10.0. The test sections contain the following materials:

- A FRTR fuel element with an end bracket design employing a full 360° contact area with the process tube for fretting corrosion studies.
- Two dummy Zircaloy-2 clad elements for uniform corrosion testing of supports.
- Two NIN1 fuel elements for uniform corrosion testing.
- Three Zircaloy-2 clad fuel elements for braze closure testing.
- One KSE3 fuel element for uniform corrosion testing.
- One FRTR rupture inducing cutting tool for integrity testing.

TF-8 - Uniform corrosion testing of A-212 carbon steel, 304 stainless steel and Zircaloy-2 was continued. Operating conditions are 700 F, 3300 psi and pH 10.0.

TF-9 - The test to evaluate the closure mechanism on two special stainless steel clad thermocouple elements was completed.

TF-13 - Heat transfer studies continued at 700 F and 125 psi.

DECLASSIFIED

DECLASSIFIED

HW-77499

TF-15 - Corrosion testing continued at operating conditions of 1100 F, 3300 psi and pH 9.0 with ammonium hydroxide and hydrazine added. Coupons of 304, 316 and 406 stainless steel, welded 316 stainless steel, thoriated nickel, zirconium alloys, Hastelloy-X, Stellite and D-979 alloys are being tested.

TF-17 - Testing to evaluate the corrosion of A-212 carbon steel, 304 stainless steel, Admiralty metal and 70-30 cupro-nickel was started. Operating conditions are 318 F, 72 psig and pH 9.0 adjusted with ammonium hydroxide.

Design Test 1134 - Hydrostatic Cycling of NPR Pipe Sections - Testing of the twentieth specimen is in progress. Testing of one specimen was completed during the report period.

Manager, Research and Engineering

FACILITIES ENGINEERING

DESIGN ENGINEERING

Vertical Safety Rods - Graphite Distortion

Due to a lack of available reactor outage time, shield penetration effort for VSR channel #28 at the 105-C Reactor has not been completed. Rework of the present cutter assembly to improve brazed bond of the carbide inserts has been completed and is expected to eliminate the cutter performance problem encountered during the initial on-reactor test last month. Off-reactor testing of the geared drive chain cutter graphite reamer has been initiated. The rate of cutter feed has been materially improved and now ranges from 7/16" per minute to as high as 1 1/4" per minute, depending upon the amount of material removed.

105-K Reactor Zirconium Tube Program - Design

Test work has been completed to evaluate alternative materials which are more stress corrosion resistant for use as Tru-Arc type snap rings on the rear gunbarrels at the K Reactors. Present program plans are for the use of this type of ring on the reactor rear face in place of the thick section ring used on the front face of the reactor to reduce outage time requirements. The test results indicate that a heat treated Inconel ring will have adequate mechanical strength and a satisfactory degree of stress corrosion resistance. Specifications for the procurement of full reactor quantities of these rings are being prepared.

The design basis for the unirradiated fuel handling and charging system for the K Reactors has been approved by the Program Representatives. The basis calls for separate storage areas for self-supported, non-self-supported, and enriched fuel. A single magazine loading station will be provided to handle all fuel types. Additional design work will be required to optimize the loading station to reduce metal handling and to speed up this operation. Operating experience has indicated a need for a method of moving SSFE type fuel elements down the discharge chutes to prevent fuel hang up. Several alternative methods of providing this function are being studied.

Flexible Horizontal Control Rods

A program document (HW-77178) describing the horizontal control rods at the K Reactors, their operating problems and possible solutions, has been completed. The document briefly describes the program which has the objective of installing a prototype flexible horizontal control rod in one of the K Reactors. The program encompasses channel sleeving to prevent 3X balls from entering the HCR channel, replacement of the track blocks in the channel to give more clearance and improved bearing for flat rods, and new rod tips for out-of-reactor and in-reactor testing and evaluation.

DECLASSIFIED

HW-77499

Shop fabrication of the ten foot prototype rod section is continuing on a low priority basis until the assembly problem previously encountered has been resolved.

K Reactor Gamma Monitoring System

The design basis for the proposed K Gamma Monitoring System renovation has been approved by the Project Representatives and is awaiting Design Council approval. This basis has been prepared for use by the Architect Engineer in the preparation of detailed design of the proposed system modification upon the receipt of a project authorization.

C Reactor Inlet Nozzle Adaptor

Studies have been made of alternate designs of the inlet nozzle connector adaptor fittings as a result of the problem encountered with the present aluminum fittings. These fittings have a tendency to neck down if the connector coupling nuts are tightened excessively. This resultant constriction in turn causes a flow reduction. The study results indicate that the use of a 300 series stainless steel adaptor will minimize this problem and will reduce the constriction to manageable limits. There has been considerable experience accumulated on other reactor inlet assemblies with a similar aluminum to stainless steel couple with no adverse results noted. Information regarding the use of the proposed fitting has been transmitted to Manufacturing Section.

Evaluation of Radiactive Materials Shipping Casks

The shipping cask evaluation program continues with the analysis being made of the "B" casks. These casks are being evaluated in accordance with the cask design criteria. These criteria which will be used as a basis for the cask evaluation program have been completed and will be issued upon completion of management review.

Budget Studies

Studies have been completed on a number of proposed projects for possible inclusion in the FY-1964-65 PA&C and Equipment Budget submission. Among the studies which were prepared are the following:

- Intermediate Range (Nuclear) Monitoring, All Reactors
- Safety Circuit Modifications, All Reactors
- Linear Power Rate of-Rise Instrumentation, All Reactors
- Reactor Control and Safety Rod Improvements, 105-C, KE and KW
- K Area Gas System Improvements
- Acid Feed Facility for Low pH Control, Six Old Reactors
- Coolant Backup, Six Old Reactors
- Renovation of the Horizontal Control Rod System - K Reactors,
(Program Document)
- Top Thermal, Biological Shields and Ball 3X Systems, (Program Document)

PROJECT ENGINEERING

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

KER Loop 3 was restored to service April 11 with the installation of two modified 275 hp recirculating pumps. The vendor has been instructed to proceed with fabrication of modified impellers and thrust bearing components, the installation of which will be effected at HAPO under Byron-Jackson's supervision.

The purchase order for the safety circuit equipment was acknowledged by GE-APED on April 2 with a delivery promise of eight months.

A revised design progress schedule has been submitted to RLOO-AEC for approval. The completion of design has been held up because of delay in the placement of the purchase order for the safety circuit equipment. Completion of design will be undertaken as soon as vendor information becomes available.

New specifications and a requisition are being readied for submittal to RLOO-AEC Purchasing for the neutron monitoring system.

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

Installation of new sample lines and consolidation of far side sample rooms continued at 105-D and F Buildings.

CGI-905, Interim Modifications for Coolant Backup, 100-B, C, D, DR, F, and H

A revised project proposal has been prepared, requesting a redistribution of funds between capital and expense and extension of the completion date by one month.

CGI-939, Analog-to-Digital Converter System for Temperature Monitoring, B, C, D, DR, F, and H Reactors

The fourth area installation is in progress. Instruction and maintenance manuals for the Analog-to-Digital Converters have been received from the vendor and a significant number of errors have been found in their drawings. The Commission has been requested to ask the vendor for "as-built" drawings.

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

Combustion Engineering Company is preparing a proposal for design and installation of this facility. Representatives from that company visited HAPO on April 4 to discuss the design criteria and to clarify some of the technical requirements.

DECLASSIFIED

DECLASSIFIED

HW-77496

EQUIPMENT DEVELOPMENT

105-K Reactor Zirconium Tube Program - Development

Analysis of the data obtained during the April on-reactor test at 105-KE Reactor indicates that for some unexplained reason insufficient graphite is being removed from Row 40 process tube channels. Test boring from other zones in the reactor indicate sufficient graphite removal is being obtained to meet stated design criteria. The problems associated with the reactor zones in the vicinity of tube Row 40 will not affect current 105-K Reactor retubing schedules inasmuch as the May outage includes only tubes below Row 30. Equipment preparation is proceeding as scheduled and will be ready for the initial outage in May.

Self-Supported Fuel Element (SSFE) Charging

Preparations are continuing to permit charging of self-supported fuel elements on an interim basis until a production system can be procured. The interim system will utilize the three prototype charging machines, magazines, pallets, a work platform hoist, and a conveyor mechanism mounted on the front work platform. Two of the prototype charging machines are on plant and are being utilized for training of Supplemental Crews personnel. The third machine, designed and fabricated by Union Machine Works, has been returned to the vendor for modification. A second prototype of the Union Machine Works design will be procured to permit installation of an on-reactor prototypical system. Delivery of 200 magnesium SSFE magazines ordered from Pacific Steel Products is approximately three months behind schedule. To date we have received 57 units, with an additional 50 units promised for delivery in the near future. Production of the plastic strip liner inserts continues to hamper completion of the order. A second order for an additional 200 magazines has been placed with the same vendor, with delivery promised by July.

Prototype High Speed Scanner

Operation of the high speed scanner prototype continues with no problems or unusual incidents occurring; total operating hours to date are approximately 19,500.

Design Test Service

The N- Reactor program utilized 415 hours of engineering effort for design test service.

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

Detailed design is 25 per cent complete versus 30 per cent scheduled. Twenty-seven drawings and two procurement specifications have been issued for comment. Field tests were conducted to determine the feasibility of applying regenerative braking on all two-speed platform drives. An evaluation of the results indicated little was to be gained and this proposal has been dropped from further consideration. Arrangements have been made with the General Electric Company's Advanced Technology Laboratory for the performance of an independent review of portions of the detailed design prepared for this project. The initial work on this review is under way.

A new construction PERT schedule has been issued.

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

The functional specification for the static switching assemblies has been completed and the purchase requisition is being prepared.

CGI-971, Ventilation Improvements, 1706-KE/KEE Buildings

All work is complete except for balancing of the newly installed system.

CAI-975, Fence Relocations, 100-B, D, and K Areas

The project proposal has been completed and is being routed for signatures.

CGI-976, Automatic Filter Backwash System, 183-DR Building

The first purchase order was placed on February 20. Actual construction started April 1. Electrical cable trays have been run the full length of the 183-DR Building and laterals run for each filter control panel.

MJA-39, Painting, Lump Sum Contract, B, H, D, and DR Areas

This work was completed April 23. Final acceptance papers have been completed and signed by Operations.

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

J. A. Jones Construction Company has sent a second letter to paint vendors, requesting additional information on their products and names and locations of customers having their products in use for eight years.

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

Gages installed:	<u>This Period</u>	<u>To Date</u>
105-B	42	42
105-D	132	490
105-DR	406	902
105-F	179	281
		<u>1,715</u>

DECLASSIFIED

DECLASSIFIED

HW-77499

MJA-53, Installation of Rear Header Expansion Joints, B,D,F,DR, and H.

Design work for the installation of bellows expansion joints in the rear crossheaders at 105-B,D,DR, and F continued. All drawings have been issued for comment. Detailed drawings for 105-H have been completed, approved, and issued.

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

An order has been placed for the complete closed circuit TV system; comprised of remotely operated camera and tripod, control cable, viewing equipment, and remotely controlled station.

AR-P-35011, Continuous Process Gas Chromatographs for B, D, DR, F, and H Reactors and Slave Recorders for Same Reactors Plus C, KE,KW

Two units were shipped from Altadena, California, April 23. These are for installation in 105-B and F.

R-20520, K Retubing

Following are procurement details relating to the K Retubing Program:

Zirconium tubes received from Wolverine Tube Company: 1,634, of which 700 have been Van Stoned and are ready for pile use.

Nozzles received from Gougler Machine Company: 1,423, and another 600 have been shipped.

Gas seals received from Los Angeles Standard Rubber Company: 2,150, with 800 boots per week promised.

Resistoflex Corporation has started assembly of the front inlet connector assemblies (pigtails). Shipment of 250 pieces is expected first week in May.

Spacer rings received, 2,200; retaining rings received, 1,500.

Project Proposals Submitted to RLOO-AEC

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

CPFF Construction Service Contractor-Liaison

Issued ten new work orders and supplemented two old jobs for a total of \$83,013 to J. A. Jones Construction Company.

Plant Forces Work Review

The Labor Standards Board approved four jobs for assignment to plant forces, estimated to cost \$21,792.

RT Jessen:dgm
cc: File

Manager, Facilities Engineering

[REDACTED]

FINANCIAL

ACCOUNTING

The FY 1964 and FY 1965 operating budgets for IPD were completed and submitted to Contract and Accounting Operation as scheduled.

Reactor cost personnel observed and verified the physical inventory of essential materials in B and C Processing Operations.

Overtime control levels for the third quarter of FY 1963 were established and approved by the General Manager.

IPD Property management procedures have been issued to each component manager and supervisor who has been delegated this responsibility. This procedure should achieve improved property management and control.

AUDITING

Ten revisions to AEC Manual Chapters were reviewed for their effect on Department Operations.

BUSINESS AND INFORMATION SYSTEMS

During the month of March, considerable effort was spent in Production Fuels Section developing a revised Preventive Maintenance Program. This included the requirements of such a system, the development of expense codes to be used and a review of the equipment to be placed on this system. The necessary programming arrangements were made to accommodate their Essential Materials Report on a weekly basis. These reports are now being prepared weekly by EDPO using the pre-punched card concept developed in the 100 Areas.

Carl Reed

Acting Manager, Finance

CE Reed:slb

DECLASSIFIED

[REDACTED]

F-1

DECLASSIFIED

HW-77499

SIGNIFICANT REPORTS ISSUED

<u>Number</u>	<u>Class'n.</u>	<u>Author</u>	<u>Date</u>	<u>Title</u>
HW-76701	Secret	JW Ballowe	3-1-63	Intermediate Range (Nuclear) Monitoring System Budget Study FY-1964
HW-76700	Secret	JW Ballowe	3-1-63	Linear Power Rate-of-Rise Instrumentation Budget Study FY-1965 and Revision of FY-1964
HW-77207	Unclass.	DF Watson	4-17-63	Budget Study-Permanent Acid Feed Facilities for Low pH Control - Six Old Areas
HW-77156	Unclass.	NF Fifer	4-2-63	Project Representatives Meeting No. 1, Improvements to Gamma Monitor System 105-KE-KW
HW-76254 Sup. 1	Unclass.	MH Schack	4-8-63	PT IP-565-AM Sup. 1, Installation of Zirconium Process Tubes 105-KE and KW Reactors
HW-77062	Secret	FJ Kampr	4-12-63	Budget Study, FY-1965 Vertical Rod Channel Sleeving and Flexible Rod Installation C, KE, KW, DR, and H Reactors
HW-77178	Secret	PH Hutton	4-16-63	Preliminary Engineering Program for Renovation of the Horizontal Control Rod System - K Reactors
HW-77374	Secret	JW Ballowe	4-24-63	Fuel Element Handling and Charging Equipment 100-K Area
HW-77324	Secret	JW Ballowe BW Herrman	4-22-63	Safety Circuit Modifications - All Reactors Budget Study - FY-1965 and Revision of FY-1964
HW-75902 Rev. 2	Unclass.	FB McCarthy GE Bonham	3-14-63	Metal Handling System Zirconium Tube Program 100-K Reactor
HWS-5992 Rev. 1	Unclass.	FB McCarthy	3-27-63	SSFE and Bumper Charging Machine for the K Reactors
HW-77067	Conf.	CA Munro	3-26-63	Classification Instruction for Arthur D. Little Company for Use in Conjunction with Contract CA-379

Number	Class'n.	Author	Date	Title
HW-77237	Unclass.	GF Howden	4-15-63	Instructions for Maintenance of K Reactor Gunbarrel Deburring and Snapping Groove Cutting Machine
--	Unclass.	R Sherrard	4-2-63	Final Report - Design Test 1073 - Resistance Temperature Detectors for 105-N
Memo Report 63-2	Unclass.	DB Lovett	4-19-63	Insulation Resistance Test of Feed-Through Header
--	Unclass.	JL Rand	3-22-63	K Emergency Pump System - 165-KW Boiler and Pump Tests
HW-76768	Unclass.	KG Hawkins	3-25-63	Design Test 1139 - 105-K Inlet Nozzle Strength Test Final Report
HW-77051	Unclass.	M Pociuluyko	3-25-63	Design Test 1085 - Addendum, NPR Inlet Valve Calibration Tests Report of Test Data
HW-76781	Unclass.	DW Keefer	4-8-63	Design Test 1149 - 100-K Van Stone Gas Sealing Test - Final Report
HW-75950	Unclass.	KG Hawkins	4-10-63	Design Test 1026 - Phase II NPR Connector Evaluation - Final Report
HW-77331	Unclass.	JL Rand RW Moss	4-22-63	Evaluation of pH Electrode - Final Report
HW-50500 B Rev.	Secret	AD Vaughn	3-1-63	IPD Plutonium Conversion Tables
HW-77341	Secret	RD Carter	4-22-63	Semi-Annual Summary Report - Reactor Potential Gains in Operating Efficiencies through December 1962
HW-77343 RD	Secret	WN Mobley	4-19-63	Uranium Delivery Schedule
HW-77370 RD	Secret	WN Mobley	4-23-63	Production, Receipts and Inventories
HW-77386	Secret	WN Mobley	4-23-63	Procurement of Enriched Lithium-Aluminum
HW-77043	Secret Red Label	JE Minor JW Riches JT Stringer	4-8-63	Report to the Working Committee from the General Electric Company

DECLASSIFIED

DECLASSIFIED

HW-77499

<u>Number</u>	<u>Classif.</u>	<u>Author</u>	<u>Date</u>	<u>Title</u>
HW-73149	Secret	EA Weakley	1-11-63	Status of Alloyed Dingot Program, January, 1963
HW-77199	Unclass.	G Miller	4-4-63	Design Criteria for Precision Demensional Measurement and Control Equipment
HW-77240	Unclass.	G Miller	4-10-63	Completion Report, on Automatic Lathe Loader
HW-77321	Conf. Undoc.	GB Hansen	4-18-63	Uranium Quality Control Analytical Results
HW-77357	Conf.	WG Jolley	4-22-63	Report of Uranium Accountability in Manufacturing Operation Process for Period Ending 3/3/63
HW-77358	Secret	GB Hansen	4-22-63	Report of Uranium Isotope Analysis
--	Unclass.	JJ Wick	3-13-63	Process Work Request Procedures
HW-76393	Secret	JJ Wick	2-11-63	O4T Lithium-Aluminum Target Element Production
HW-77025	Secret	RE Daling	3-21-63	Plant Acquisition and Construction Budget Submission for FY 1965 and Rev. FY 1964, Production Fuels Section - IPD
HW-77005	Unclass.	HA Aeschliman	3-20-63	Equipment not Included in Construction Projects, FY 1965 and Revision FY 1964, Production Fuels Section - IPD
HW-76616	Unclass.	TW Gore	4-23-63	Design Criteria for Consolidated Service Facility - 300 Area
--	Unclass.	FW Grubb	4-17-63	A Formulation of Maintenance Information Requirements and a Demonstration of Data Collection Equipment in Manufacturing Maintenance Shop

Number	Class'n.	Author	Date	Title
HW-77209	Secret	RS Bell	4-8-63	Reactor Coolant Stoppage - KE Reactor
HW-76893	Unclass.	RD Duncan	4-9-63	Evaluation Report, Foam Silicone Gunbarrel Bellows Repair, Material Evaluation
HW-77252	Unclass.	LD Gustafson	4-19-63	Effects of Low pH Water on Reactor Water Plant Carbon Steel Piping
HW-73987	Unclass.	CR Barker	4-8-63	Development Test DT-IP-507 - Nozzle Cap Compression O-Ring Seal for Six Old Reactors
HW-76690	Secret	JW Hedges	4-1-63	Gravity Fed Water Supply to Reactor Storage Basins

DECLASSIFIED

DECLASSIFIED

HW-77499

TRIPS

<u>Name</u>	<u>Firm & Location</u>	<u>Date</u>	<u>Purpose</u>
D. F. Watson	Chas. T. Main, Inc. Boston, Mass.	4/7-10/63	Consultation regarding export system hydraulic transients.
M. H. Schack	ASME Association Portland, Oreg.	4/18-19/63	ASME Business Meeting Official Delegate.
P. B. McCarthy	Union Machine Works, Inc. Seattle, Wash.	4/24/63	Provide engineering direction on revised SSFE charging machine being fabricated by vendor.
J. R. Spink	Willamette Iron & Steel Portland, Oreg.	4/10/63	Contact prospective vendors for capability and interest in design-development work on VSR channel enlarge- ment equipment.
	Allied Engineering & Production Co. Alameda, Calif.	4/11/63	Same
	Precision Tool & Grinding Palo Alto, Calif.	4/11/63	Same
	International Design Corp. Tacoma, Wash.	4/12/63	Same
	Heath Manufacturing, Inc. Kent, Wash.	4/12/63	Same
H. F. Jensen	GE-Silicone Products Dept. Seattle, Wash. GE-Appliance Dept. Renton, Wash. Graco Company Seattle, Wash.	3/29/63	Contact vendors on material and equipment advances and special applications to reactor seal problems.
F. J. Mollerus	Westinghouse Electric Sunnyvale, Calif.	4/22-24/63	Investigate vibration problem 1500 HP low lift pump - K Plants.

Name	Firm & Location	Date	Purpose
J. M. Fox, Jr.	Flight Propulsion Div. General Electric Co. Cincinnati, Ohio	4/20-25/63	Metallurgy of high temperature materials for control and pressure devices.
	Huntington Products Div. International Nickle Co. Huntington, West Va.		Same
	Paint & Pigment Dept. DuPont Co. Wilmington, Del.		Same
R. T. Jaske	US Public Health Service Cincinnati, Ohio	4/2-7/63	Attend meeting to review technical status of low flow augmentation for water quality control.
	US Bureau of Reclamation Grand Coulee, Wash.	4/29/63	Make arrangements for 1963 river cooling program.
R. H. Scanlon	Pratt & Whitney Co., Inc. West Hartford, Conn.	4/1/63	Evaluation of Air and Electronic gauging equipment applications.
	Bausch & Lomb, Inc. Rochester, N.Y.	4/2/63	Same
	Daytronics Corp. Dayton, Ohio	4/3/63	Same
	Sheffield Corp. Dayton, Ohio	4/3/63	Same
F. Hunter	American Society of Mechanical Engineers Indianapolis, Ind.	4/22-24/63	Plant Maintenance and Engineering Conference
	General Electric Co. Fort Wayne, Ind.	4/25-26/63	Discuss Maintenance Measurement Techniques
G. L. Hammons	National Lead Company of Ohio Fernald, Ohio	4/18-12/63	Discuss Feed Site Data System.
G. A. Huff	Savannah River Plant Aiken, S. C.	4/18-19/63	Discuss End Bonding for Hot Die Sizing.

DECLASSIFIED

DECLASSIFIED

HW-77499

<u>Name</u>	<u>Firm & Location</u>	<u>Date</u>	<u>Purpose</u>
G. A. Huff	Manufacturing Services Schenectady, N.Y.	4/22-25/63	Optics in Industry Seminar
G. A. Huff	Sheffield Corp. Dayton, Ohio	4/26-27/63	Discuss design criteria for precision measurement and control equipment.
S. S. Jones	Albrook Hydraulic Lab. Pullman, Wash.	4/1-2/63	Consultation on export system.
R. W. Pitman	Livingston, Mont.	4/5/63	Presented paper at American Waterworks Assoc. (Montana Section).
S. S. Jones	Charles T. Main Co. Boston, Mass.	4/7-8/63	Consultation on export System.
	Albrook Hydraulic Lab. Pullman, Wash.	4/10/63	Same
G. F. Owsley	Cincinnati, Ohio	4/17-18/63	Attend ANS Topical Meeting.
	ALCOA New Kensington, Pa.	4/19/63	Discuss spline fabrication and fuel element problems.
R. W. Pitman	Eugene, Oregon	4/18-19/63	Attend meeting of American Waterworks Assoc. (Pacific NW Section)
O. H. Greager	Palo Alto, Calif.	4/19/63	Attend Special Committee Meeting of the GETHC.
	Vallecitos Atomic Lab. Pleasanton, Calif.	4/20/63	Consult in connection with Test & Pool Reactor Subcouncil.
D. E. Newby	Indianapolis, Ind.	4/22-24/63	Attend ASME-AIPE Maintenance & Plant Engineering Con- ference.
D. E. Newby	Schenectady, N.Y.	4/25-26/63	Discuss maintenance planning organizations with G.E. Manufacturing Service personnel.
A. McDonald	Westinghouse Plant Sunnyvale, Calif.	4/21-25/63	Evaluate condition of 1500 HP motor which failed in service in 190-KW.
C.F. Quackenbush	San Diego, Calif.	4/28-6/3/63	Attend meeting of American Standards Assoc. - B31 ~ Committee on Nuclear Piping.

Name	Firm & Location	Date	Purpose
C. R. Oak	Pacific Steel Products Company Seattle, Wash.	4/9/63	Observe progress of poison column control facility charging machines.
C. R. Oak	Union Machine Company Seattle, Wash.	4/9/63	Review progress on K self-supported fuel charging machines.
D. A. Snyder	University of Wash. Seattle, Wash.	4/19/63	Attended a one day conference of the American Institute of Industrial Engineers.

DECLASSIFIED

DECLASSIFIED

HW-77499

VISITORS

<u>Name</u>	<u>Firm & Location</u>	<u>Date</u>	<u>Purpose</u>
Dr. T. Clark	Metallurgical Prod. General Electric Detroit, Mich.	4/5/63	Discussion of pyrolytic graphite fabrication problems and schedules.
N. H. Wood	Advanced Technology	4/23-25/63	Participate in the review of CGI-960, "C and D Work Platform Safety Improvements - All Reactors," design.
H.V. McCormick	Ingersoll-Rand Co. Portland, Oreg.	4/12/63	Discuss air motor drives for tooling undergoing development.
R. D. Wheeler	Ingersoll-Rand Co. Seattle, Wash.	4-12-63	Same
E. W. Legas	Chicago Pneumatic Co. Seattle, Wash.	4/12/63	Same
A. E. Smith E. H. Whary	Gulton Industries Albuquerque, N. Mex.	4/9/63	Discuss dose rate telemetering.
W.N. Rosenberg	Sonobond Corp. West Chester, Pa.	4/16-18/63	Discuss ultrasonic welding.
J. Foss	Bridgeport Brass Seattle, Wash.	4/18/63	Cap and can procurement.
J. Armanino	Bridgeport Brass Riverside, Calif.	4/18/63	Cap and can procurement.
D. Guy	Alcoa Seattle, Wash.	4/23/63	Cap and can procurement.
J.M. Henderson	Bailey Meter Co. Seattle, Wash.	4/1-19/63	Consultant contract for instruction and calibration of boiler controls.
R. L. Meyer	Betz Laboratories Olympia, Wash.	4/18/63	Check on water softening equipment at powerhouse.

END

**DATE
FILMED**

2 / 5 / 93