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HW--78451

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IRRADIATION PROCESSING DEPARTMENT

MONTHLY REPORT

JULY, 1963

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HANFORD ATOMIC PRODUCTS OPERATION

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IRRADIATION PROCESSING DEPARTMENT
MONTHLY REPORT
JULY, 1963

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By Authority of PR-24 (CG-PR-2)

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Compiled by
 IPD Personnel
 August 14, 1963

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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-9
Plant Facilities	C-11
<u>RESEARCH AND ENGINEERING</u>	
Process and Reactor Development	D-1
Process Technology	D-7
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

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SUMMARY

MANUFACTURING

Reactor MWD input production for July was 3.5% above forecast: 11.4% above at the smaller reactors and 6.7% below at the K's. Total production for CY 1963 to date is essentially at the same value reached at a similar date in the record production year of CY 1961.

Over-all time operated efficiency for July was 83.0% (81.9% forecast): 85.8% at the smaller reactors and 74.7% at the K's. The H Reactor concluded 60.6 days of continuous operation July 19 with a shutdown to repair a water leak. This exceeded the continuity of operation record for any Hanford reactor by 10.2 days. The KW Reactor achieved an operating record for the K Reactors with 45.2 days of continuous operation prior to a scheduled outage on July 8.

No new power level records were established during July. The F Reactor achieved a new monthly production record for that reactor exceeding their April, 1963 record by one per cent.

Four ruptured I&E fuel elements, two natural and two enriched, were removed from the reactors. The enriched ruptures were at the KE and KW Reactors and the two natural ruptures were at D. One natural rupture at D was caused by mechanical damage and failed at two per cent of goal exposure.

Two rear Van Stone flange leaks and four internal tube leaks were corrected. A total of 18 new process tubes (aluminum) was installed.

PRODUCTION FUELS

A total of 640 tons of natural and enriched fuel elements was produced during July, 101% of the forecast.

Production through the AlSi Shop was at the rate of six canning lines for nine days and nine canning lines for 13 days for a total of 171 canning line shifts. The reduced production for the first nine operating days in July permitted approximately one-third of the Shop personnel to complete their vacations during this period.

Canning line operating efficiency was 98.5% for the month.

Bare core inventory at month's end is 1776 tons, a 3.3 months' supply. These figures include 110 tons of dingot material.

Finished fuel inventories totaled 1474 tons, a 2.4 months' supply. These figures include 209 tons of dingot material.

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As reported last month, excessive external braze porosity and bond test rejects have been experienced in the canning of several lots of natural ingot cores shipped from the feed site after May 1, 1963. Because the problem has proved to be highly ingot oriented, with a relatively low population of affected ingots, attempts thus far at the feed site and at HAPO to specifically define the cause of the problem have been inconclusive. Further effort is being made to select affected core samples for surface hydrogen analysis, metallographic examination, and degassing. Natural cores shipped from the feed site after June 13 appear to be of uniform good quality.

A fuels utilization authorization was approved and initial quantities of graded fuel elements were shipped to the reactors for charging in upstream low rupture potential positions.

Because of the high discharge forces (up to 3200 psi) and related problems experienced in the recent discharge of K Reactor natural and enriched self-supported fuel columns exposed to 1200 and 500 MWD/T, respectively, a decision was reached to reduce the nominal support height of these fuel models five mils. Preliminary irradiation data on the effects of eccentric fuel positioning indicate this change can be made without incurring excessive temperature unbalance or fuel cladding corrosion. Since the desired reduction can be achieved by altering the dies used in the finished projection fuel sizing operation, arrangements have been made to reduce the support height of existing inventories for the K Reactors' self-supported fuel, as well as future production.

Nondestructive and destructive tests of the natural self-supported hot die sized fuel elements, assembled last month incorporating process revisions to improve closure integrity, confirmed that this material was acceptable for preliminary irradiation testing. Twenty columns of the hot die sized pieces and ALSi controls were premeasured and charged in C Reactor on July 27, 1963.

RESEARCH AND ENGINEERING

Power levels at all reactors were restricted by a bulk outlet temperature limit. The limit was 93.5 C at D and F Reactors and 95 C at all other reactors.

The first major discharge of high-exposure self-supported fuel elements from Zircaloy tubes at KW Reactor was made. High forces were required for regular charge-discharge operations with the higher exposure columns; this resulted in damage to the supports of the newly charged elements and made it necessary to discontinue use of the displacement-discharging technique with such columns. Seven columns of high-exposure fuel with reduced support height were discharged without difficulty. Examination of the fuel is now under way.

Hazards Summary Reports (Volume 1) for both the six smaller reactors and the K Reactors were issued. This completes publication of the three-volume series, which provide for the six smaller and the K Reactors, respectively, a

hazards and accident analysis (Volume 1), process control and technical data (Volume 2), and a physical description of the facilities (Volume 3).

Studies of Hanford capabilities for alternate products continue. Reports are being prepared on polonium-210 production and irradiation of depleted uranium for production of 18% Pu-240 plutonium.

Operation of the 1706-KER recirculation loop facility in support of the NPR development continued. Loops KER-1 and 2 are operating with lithium-aluminum target elements and enriched N inner fuel pieces as heater elements to evaluate target element swelling characteristics and tritium migration. Loops KER-3 and 4 are charged with regular N fuel assemblies which have reached 640 MWD/T and 315 MWD/T, respectively, against a goal of 2100 MWD/T.

FACILITIES ENGINEERING

During an outage on July 8 and 9, 74 columns of self-supported fuel elements were discharged from zirconium tubes at the 105-KW Reactor. This on-reactor experience indicated that the displacement discharge concept is feasible on natural fuel element columns irradiated up to 120% of goal. Irradiations of 170% of goal appear to be a problem to displacement discharge because of damage to the fuel element having supports of standard dimensions.

Minor operating difficulties were experienced in the loading section of the Union Machine Works charging machine used during the KW outage. These were corrected by readjusting an improperly set control valve. The machine developed a maximum force of 3500 pounds during the outage, compared to the design capability of 4800 pounds. Valve replacements have since effected some increase in developed force, with further efforts still in progress. Forces usually required in the charge-discharge operations are in the 2000- to 3000-pound range.

Information developed during most recent contacts with the Union Machine Works indicates their delivery of the Mark II prototype charging machine will be later than the promised date of August 12. The Pacific Steel Products Company charging machine is currently being revised for suitability as a spare.

Additional mockup testing of the VSR channel graphite reamer was successfully completed. Average distortion in the channel was very good, with a minimum amount of overcutting occurring in regions of offsets and sharp curvatures. Channel liner blocks were installed in the mockup without difficulty. Examination of the enlarged channel indicated that no process tube channels were penetrated by the reamer, the nearest approach being 3/32 inch from the tube block bore.

A "total information" VSR probe has been designed and fabricated to measure the location of all four walls of a VSR channel. The probe was tested in a mockup of No. 28-C VSR channel with limited success. More than half the readings agreed with lay-up data within .060 inch, which is the sum of the expected errors of the probe and mockup.

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Tests have been completed on production lot samples of aluminum Van Stone gaskets. The installation of these gaskets on the inlet and outlet of all zirconium tube assemblies has been authorized.

The evaluation of all off-site shipping casks currently utilized by the Department for compliance with the established cask design criteria has been completed. None of the casks evaluated met the criteria, primarily due to their inability to withstand impact and fire conditions. A design program for the improvement of these casks has been initiated.

E. H. Research Laboratories, Incorporated, and GE-APED log picoammeter prototypes were qualified per Purchase Specification HWS-5991, Revision 1. This completes the evaluation work for the Fixed Radiation Monitoring Program. A specification incorporating information developed during this evaluation is being prepared.

A Completion Notice dated July 10, for Project CGI-971 (Ventilation Improvements, 1706-KE/KER Buildings) is complete with minor exceptions, and the project is being closed out.

RESPONSIBILITY

There was no significant change in responsibilities.

FORCE SUMMARY

	<u>Exempt</u>	<u>Non- Exempt</u>	<u>Total</u>
General	7	2	9
Research and Engineering	91	56	147
Manufacturing	398	1398*	1796
Production Fuels	109	421	530
Facilities Engineering	97	39	135
Financial	<u>21</u>	<u>14</u>	<u>35</u>
TOTAL	723	1929	2652

*Includes 10 M Reactor replacement trainees.

SAFETY, SECURITY AND RADIATION EXPERIENCE

There were 101 medical treatment injuries, one disabling injury, no security violations or radiation exposures exceeding operational control.

INVENTIONS

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

O C Schroeder
for General Manager

AB Greninger:DLD:bm

MANUFACTURING

PRODUCTION OPERATION

There were no adjustments in discharge exposure goals initiated during July. Discharge exposures reached another Post CG-558 high exceeding the previous high set last month by five per cent. This performance is the result of high reactor inputs for recent months and the unclassified plutonium output.

JULY DISCHARGE EXPOSURE (MWD/T)

<u>Regular Uranium</u>		<u>Enriched Uranium</u>	
<u>Smaller</u>	<u>K's</u>	<u>Smaller</u>	<u>K's</u>
725	836	976	886

Rail and truck shipments of Essential Materials were as follows:

Carload shipments for IPD	-	154
Carload shipments for other Depts.	-	116
Truck shipments for IPD	-	<u>131</u>
		401

REF ID: A68710

HW-78451

MONTH	REACTOR OPERATION STATISTICS - PROCESSING										
	B	C	D	DR	F	H	KE	KW	TOTAL HOURS	% OF TIME	TOTAL
JULY, 1963											
INPUT PU (% OF FORECAST)	100.2	115.1	109.3	106.7	124.3	112.5	95.5	91.2			103.5
TIME OPER. EFF. (% OVERALL)	79.9	89.7	82.1	82.2	92.9	87.7	76.1	73.3			83.0
NEW TUBES INSTALLED	1	3	4	4	1	5	0	0			18
WATER LEAKS - TUBE	0	0	0	1	1	2	0	0			4
- VAN STONE	1	0	1	0	0	0	0	0			2
FUEL ELEMENT RUPTURE	0	0	2	0	0	0	1	1			4
HELIUM CONSUMED - M CU. FT.	487.0	740.4	239.2	196.5	595.6	284.2	145.5	279.4			2967.8
UTILIZATION OF REACTOR OUTAGE HOURS											
CHARGE - DISCHARGE	43.4	25.7	45.2	43.4	10.4	46.6	66.4	93.0	374.1	6.3	
RUPTURE REMOVAL	0	0	19.0	0	0	0	11.1	6.1	36.2	0.6	
WATER LEAK	13.9	0	11.4	11.4	15.0	25.9	0	0	77.6	1.3	
TUBE REPLACEMENT	20.4	25.9	5.3	16.4	0	6.9	5.4	6.1	86.4	1.5	
MAINTENANCE	59.5	4.6	15.2	36.3	14.1	12.1	11.8	49.9	203.5	3.4	
STANDARD CHECK	0	0.7	0	4.0	0	0	4.0	2.5	11.2	0.2	
PRODUCTION TEST	7.2	12.2	2.2	0	0	0	77.2	28.6	127.4	2.1	
PROJECT WORK	0	0	5.3	0	13.3	0	0	0	18.6	0.3	
OTHER	5.0	7.3	29.8	21.0	0	0	2.1	12.6	77.8	1.3	
TOTAL	149.4	76.4	133.4	132.5	52.8	91.5	178.0	198.8	1012.8	17.0	
REACTOR OPERATION STATISTICS - POWER											
RIVER WATER PUMPED - M GALS.	8851.9		6779.0		3957.6	3677.1	8137.5	7737.0	39140.1		
WATER TREATED - M GALS.	3081.2	5090.3	3863.9	2776.9	3910.3	3562.7	8091.0	7737.0	38113.3		
WATER TO REACTOR - GPM NOR.	90500	100000	87500	87500	89100	83300	206000	206300	950400		
FINISHED WATER - ANALYTICAL DATA											
TURBIDITY PPM AVG.	.007	.005	.005	.004	.005	.002	.006	.005			
PH AVG.	6.60	6.60	6.67	6.67	6.60	6.62	6.61	6.59			
CL ₂ RESIDUAL PPM AVG.	.05	.05	.05	.05	.05	.13	.20	.22			
DICHROMATE PPM AVG.	1.69	1.37	1.96	1.89	1.80	1.86	1.85	1.73			
STEAM GENERATED M LBS.	48285		63418		30962	32900	26240	23603			
EVAPORATION RATE/LB. OF COAL					8.83	7.33	114.8	111.0			
EVAPORATION RATE/GAL. OF OIL	8.65		8.71								
TOTAL KW - HR GENERATED											3040500

B-C REACTOR OPERATION

B Reactor experienced three outages: one for scheduled charge-discharge, one from a low pressure Panellit trip when an outlet thermocouple blew out of the tube nozzle, and one from an unexplained Panellit trip.

Four outages occurred at C Reactor: one Panellit trip (0.3 hour) followed by an outage due to high tube temperature, one from cavitation of a front face pigtail, and one (0.2 hour) from low trips on the Beckman flux monitors.

To minimize future failures of the thermocouple-nozzle connections, all thermocouple wells at B Reactor were checked for tightness during one of the outages. Because of a bulge in the tip of No. 2 HCR, the rod was removed from service and will be replaced.

At C Reactor, the broaching of vertical safety rod channels Nos. 36 and 48 resulted in drop times within standards (1.96 and 2.04 seconds, respectively). VSR's Nos. 41 and 47 are not being used, and the reactor is operating on a PCA permitting two adjacent rods out of service.

The combination of rear face bellows foaming at B Reactor and operation under the provisions of a Production Test (permitting graphite temperatures of 730 C regardless of helium concentration) has reduced losses of helium by 25,000 cubic feet per day to a consumption rate of about five thousand cubic feet per day.

At Building 181-B the No. 9-C pump was placed in service following the installation of new impellers and both stage suction bowls plus a Class A overhaul on the drive motor.

Replacement of the suction bowl and impeller was required during a Class A overhaul of the No. 3 process water pumping unit at Building 183-C. The styrene fittings, installed in the low pH facility, failed when 99 per cent sulfuric acid was introduced into the system in place of the 93 per cent sulfuric normally used. It was necessary to replace these plastic fittings with fittings made of carbon steel.

D-DR REACTOR OPERATION

D Reactor experienced eight outages. Those which resulted in appreciable outage time were two outages caused by failure of fuel elements and one outage caused by an electrical power surge from lightning striking on the BPA system. DR Reactor had two shutdowns: one for scheduled charge-discharge and one to correct a partially engaged front face cap.

The stepwise program, begun in June, to reduce the nominal pH of DR Reactor process water from 7.0 to 6.6 was completed on July 14.

At DR Reactor, No. 2 horizontal control rod was replaced because of binding. The rod was swollen at a point approximately one foot from the inner end and had several scratches approximately ten feet from the inner end. Also

at DR Reactor, No. 25 front crossheader was slightly damaged during a shutdown as a result of failure of welds holding a charging machine mounting rail. The rail had moved toward the reactor from its normal position and, as a consequence, struck the valve on the crossheader drain line when the work platform was moved. The damage was corrected by replacing a 30" section of the crossheader.

The D Reactor gas loss during normal operation has improved approximately 60 per cent subsequent to completing the mass foaming of rear process tube bellows and other gas envelope repairs during June.

F REACTOR OPERATION

A monthly production record was achieved during July, exceeding the previous high established in April, 1963 by one per cent.

A process tube leak caused the only outage during July. Evidence indicated that the leak was caused by mechanical damage when a spline became jammed into the front section of the process tube.

The 182 Building export water surge suppressors cycled properly on July 11 and July 26 when impulsed by low pressure conditions.

At the request of Applied Reactor Engineering, tests were started July 5 and will continue for several months, on a proposal to eliminate idling of the 190 Building emergency turbines. During each shift, No. 10 turbine is accelerated (without warm-up) to governor speed in 10-15 seconds.

Maintenance activities in the 105 Building included installing 140 spline caps fabricated with Buna-N Seals, replacing one process tube, modifying 125 spline seals, and overhauling two vertical safety rod clutches (program 79% complete). Water plant activities included overhauling the No. 1 boiler at 184 Building (program 80% complete), replacing a 40 hp motor on the 190 Building air compressor, and replacing 150 feet of corroded six-inch sanitary water pipe in the 184 Building.

H REACTOR OPERATION

A continuous period of operation of 60.6 days was terminated by a process tube leak. During nonequilibrium operation following start-up, malfunction of a rear face PCCF ball valve and a spline seal leak caused a short duration outage and a scram. Following a second process tube leak outage, a Panellit scram was caused by a faulty gauge.

Assistance was provided to 100-B Area in maintaining export pumping backup in the export water system by use of steam operated export equipment. Electrical voltage surges on the 230 KV system caused by electrical storms in the vicinity of Midway initiated acceleration of the 190 Building turbines. No other equipment operation was affected.

Five process tubes were replaced. Two leaking tubes caused the two leak outages during the month and three, calculated to be potential leakers, were removed during the last outage.

Rear hardware of three tubes showing lower-than-normal flow was inspected. A significant flow increase was realized on the tubes following the reaming of the Parker fittings to their original size. Fuel columns of eight tubes that consistently indicated high temperatures were moved 24 inches downstream to reduce their level limiting effect.

KE-KW REACTOR OPERATION

KE Reactor experienced four outages which resulted in significant outage time. One was a scheduled outage for metal processing, one was attributed to failure of a dump valve diaphragm associated with KER-2, one was required to correct a faulty air operated valve serving KER-4 emergency storage tanks, and the other was caused by a fuel element failure.

KW Reactor was shut down on July 8 for a scheduled outage concluding 45.2 days of continuous operation. In addition, production was interrupted by three other outages which resulted in appreciable outage time. One was caused by an unexplained Panellit trip, one by a broken spline and the other was required to discharge a ruptured fuel element.

Installation of spline caps containing modified tapered inserts (Design Change 722) was completed at KW Reactor; similar modifications were previously made at KE Reactor. The revision provides an improved support for the splines. A new off-set step plug was installed on No. 19 Horizontal Control Rod at KW Reactor thereby returning the rod to service.

Low level contamination was deposited on the ground area southeast of the 105-KW Building. Origin of the contamination was an effluent retention basin at KW Reactor which had been drained to perform maintenance work. The affected areas were decontaminated and returned to normal service.

APPLIED REACTOR ENGINEERING

MAINTENANCE PRACTICES ENGINEERING

Vertical Safety Rod Purchase Order

Fabrication of universal type vertical safety rods was started following placement of the order on June 11, 1963, and it appears that the expected October, 1963 delivery date for the initial assemblies will be met.

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Horizontal Control Rods

Delivery of the 16 horizontal control rods now on order (5 half rods, 11 full rods) is still expected during November, 1963. Four of the five rods fabricated locally have been installed: one each in D, H, DR, and B Reactors. The remaining rod will be installed in H Area during August. The on-plant fabrication of two additional half rods is progressing satisfactorily, with delivery forecast for late August, 1963.

Equipment Maintenance Standards

a. In first draft status	- 42
b. Waiting for Multilith typing	- 8
c. Out for plant comment	- 19
d. Back from plant comment	- 26
e. Being routed for approval signature	- 15
f. Issued to date	- 44

Total 154

PLANT EQUIPMENT ENGINEERINGTube Outlet Temperature Monitoring System

The criteria governing the requirements and design testing appropriate for new thermocouple and well designs were issued under document HW-76811.

Process Tube Problem

The massive tube replacement program has resulted in fewer water leaks and less outage time required for tube replacement. In addition, adoption of 6.6 pH process water and the current installation of zirconium tubes in the K Reactors are expected to reduce the frequency of tube replacement by at least 60 per cent. The final report, HW-78253, concludes that the magnitude of the process tube problem has been reduced enough that it has now become a routine maintenance problem.

Horizontal Control Rods

Hardness tests on horizontal rods at D and F Reactors were taken with the remotely operated portable hardness tester. Test results showed some portions of rods Nos. 2 and 8 in B Reactor and rod No. 4 in D Reactor were annealed or approaching the annealed condition. The affected rods will be retested in about three months to determine the rate of change of hardness.

Water Plant Piping

An interim report on the status of selected sections of water plant carbon steel piping was issued as HW-76653. Results obtained by radiography and ultrasonic wall thickness instruments indicated that the piping examined was still adequate for the service pressures existing;

however, a meaningful corrosion rate correlation was not possible at this time.

Isotope Tube Wall Thickness

Document HW-78170 was issued to report an analysis of potential advantages of thinner aluminum process tube walls under conditions where a target material, for example cobalt, was incorporated into the tube wall. The in-reactor residence time of the tube would be determined by the target material irradiation time rather than the process tube internal corrosion. Either increased fuel element conversion ratio or increased reactor power level could be achieved with thinner wall process tubes.

PLANT ENGINEERING

pH Meter Accuracy

The pH meters in all areas are being checked for accuracy using 4.00, 7.06, and 10.00 buffer solutions. Discrepancies which have been found appear to result from the use of a buffer solution of approximately 7.00 which produces a 0 mv output. This, consequently, does not check the linearity or range of the instrumentation above or below the 0 mv output.

Confinement Filters

The status of the filter replacement in the reactor plants is as follows:

- 105-F - A-cell bottom two rows replaced on February 11, 1963. B-cell was visually inspected and showed no damage.
- 105-H - B-cell bottom three rows replaced on March 19, 1963. A-cell bottom two rows show visible damage and have been blanked off with a thin sheet of polyethylene.
- 105-D - Repairs to the A-cell bottom row were unsuccessful and the cell has been blanked off with a thin sheet of polyethylene.
- 105-DR - A-cell bottom two rows were replaced on June 12, 1963, and transferred to the second stage. The entire plank has been DOP (smoke) tested. B-cell bottom two rows show visible damage.
- 105-KW - A-cell bottom two rows were replaced on May 15, 1963, and the filters which were removed were transferred to the second stage. The entire bank has been DOP tested.
- 105-KE - A-cell bottom two rows were replaced on May 17, 1963, and the filters which were removed were transferred to the second stage. The entire bank has been DOP tested. B-cell bottom two rows show visible damage.

- 105-B - Both cells in B Area show no visible damage. However, both cells will be isolated and the bank DOP tested.
- 105-C - B-cell bottom two rows were replaced on June 20, 1963, and the filters which were removed were transferred to the second stage. The entire bank has been DOP tested. A-cell filters which showed no visible damage have been transferred to the second stage, and are being DOP tested.

One hundred filters, procured on an emergency basis, arrived on site July 8. All of the filters have passed the DOP tests as required by Hanford specifications and carried out by the 200-E Area Industrial Hygiene group. Two of these filters will be tested for other Hanford specification requirements at the 190-D Building. The results of these tests will determine whether the filters meet the specifications and are acceptable.

Dew-Cell Instrumentation

To improve the maintenance and use of the dew-cell system, Plant Engineering-Instruments has been requested by H Area to upgrade the system and to study the data obtained for possible improvements in leak location. If successful, this improvement will be expanded to other areas, with subsequent area personnel training in the use of the equipment and interpretation of the data.

Thermocouple Replacement, 105-D and 105-DR

Formal design was prepared by Plant Engineering-Instruments for the replacement of thermocouple leads, junction boxes, and stepping switches.

Leak Repair by Foaming, 105-B and 105-D

Helium losses at D Reactor have been reduced from approximately 25,000 cubic feet per day to 11,000 cubic feet per day at 83 per cent composition as a result of the mass foaming repair work done during the June tube replacement outage. This work included repair of approximately 1,200 rear face gunbarrel bellows and 10 to 12 feet of omega seals.

Approximately twenty-four hours of additional leak testing and repair was performed at B Reactor. At that reactor, it was found that the upper omega seals were in particularly poor condition. Results of the repair work are obscured by a Production Test which was initiated to further reduced helium consumption; however, from 2,000 to 4,000 cubic feet per day loss reduction appears to be probable as a result of these additional repairs.

Crossheader Incident, 105-DR

During a reactor outage on July 12, No. 25 crossheader at 105-DR was damaged when the charging machine support rail worked loose and caught on a rising stem valve on the 2-1/2" drain line while the work platform was being moved. Dye-penetrant testing and x rays indicated no major

damage; however, it was considered prudent to remove the damaged section of the front face header, and this work was accomplished without incident before reactor start-up. Facilities Engineering Section and Research & Engineering Section plan to conduct pressure and metallographic tests of the removed section of this crossheader.

Applied Reactor Engineering is conducting an engineering study to determine the feasibility of providing "traveling broomstick" or other protective devices at the near and far ends of the work platforms.

Standardized Pneumatic Charging Machine

The first of the standardized pneumatic charging machines has been used at both DR and F Reactors during recent outages. Two features, i.e. the pneumatic coupler and the fuel element hold-back device, should materially aid in reducing the number of damaged fuel elements occurring during charge-discharge efforts. Central Maintenance is now preparing to complete standardization of charging machines at all of the smaller reactors.

Sodium Silicate Addition to Fire and Sanitary Water - 183-D

The facility to feed sodium silicate to the fire and sanitary water at 183-D Building has been installed. This system will operate on a test basis to determine the corrosion inhibiting effects of sodium silicate on fire and sanitary piping.

107 Basins - KE-KW

An inspection by Plant Engineering to locate a basin leak revealed a large section of the inlet chute in B basin at KW was missing. The section is about 4 X 5 feet and was torn out of the chute bottom. The cause of this damage is unrelated to the basin repairs that were made last year.

Service Water Pump Bearing Failure - KE Water Plant

Engineering assistance was provided to electrical maintenance in determining the cause of thrust bearing failures on #1 service water pump at KE Area. Three bearing failures were experienced in one year. Excessive vibration of the motor was believed to be one contributing factor. Balancing the rotor reduced this vibration from 3.5 mils to 0.5 mil.

Electrical Program Document

A Manufacturing Section program document, HW-78276, was issued describing the major electrical problem status and the related responsibilities assigned to the individual operation and engineer.

Thermal Shield Lead Wire Installation

The thermal shield lead wires in KE were identified in the duct in the X-2 ceiling in preparation for splicing of new leads to the rear face. Installation and continuity checks were completed on 60 thermocouples in 105-KE and 300 thermocouples in 105-KW.

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Temperature Monitor System - RTD Failure Study

Ninety-six additional RTD's from KW were removed and inspected during July bringing the total number inspected to 496. Fifty per cent of the 96 inspected had severe pitting. In a continued effort to determine the pitting rate, pictures were taken of three specially chosen RTD's from KW. These RTD's have been returned to service in tubes having a past history of severe RTD pitting.

Export Turbine - 182-B

As recommended by Plant Engineering, the 182-B turbine drive pump was removed from service for a Class A overhaul. Several mechanical problems were found and are being corrected.

Nozzle Conversion for Bumper Fuel

The conversion at 105-B, DR, and F Reactors of essentially all front nozzles to the bumper nozzle configuration has been completed. This work was done under authorization of MJA-37. D and H Reactors had previously completed the conversion under MJA-32.

Basin Leak Repair - 107-CW

Plant Engineering recommended that repairs to a leak in 107-CW basin be achieved by use of a heavy Hypalon sheet rather than the normally accepted welding method. A resulting saving in repair cost of approximately \$40,000 was realized. The repair appears to be effective.

Audiographic Instruction Programs

Revision was completed on the Audiographic Instruction Programs for Rear Face Decontamination at K Reactors.

The following programs were completed in conjunction with Production Fuels Section as an initial effort in the fuel fabrication operation in audio-visual instructions:

Canning Operation - 313 Building
Ultrasonic Rail Welding - 313 Building
Floor Servicing (HAPO-wide applicability)

The following programs were completed for the Manufacturing Section:

Panellit Read-out Procedures - 105-DR
Sulfuric Acid Unloading - 100-H Power

This brings the total number of audiographic instruction programs issued to date to 61.

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Processing Manpower Planning Guide

The trial application of the Processing Manpower Planning Guide for all shifts during the recent two-week D outage was completed. Supervisors completed questionnaires giving their views on usefulness and suggestions for improvements. Evaluations of manpower adequacy on each shift were obtained. Subsequent meetings will be held with Reactor Managers to discuss data and benefits.

OC Schroeder

Manager, Manufacturing

OC Schroeder:DLD:bm

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PRODUCTION FUELS

MANUFACTURING

Production

The canning line operating efficiency for July was 98.5 per cent. This is 2.5 per cent greater than the forecast.

Projection elements produced during July totaled 14 tons of six-inch material and 164 tons of eight-inch fuel. The yield on six-inch self-support elements was 72 per cent and on eight-inch self-support fuel 81 per cent. There was no six-inch fuel with elliptical rails produced. The yield on the eight-inch fuel with elliptical rails was 81 per cent.

The welding yield on self-support fuel was 91 per cent and 93 per cent on the fuel with the elliptical rails.

Projection production for July and since November 1960 is as follows:

	<u>July 1963</u>		<u>To Date</u>	
	<u>Natural</u>	<u>Enriched</u>	<u>Natural</u>	<u>Enriched</u>
Tons Produced	164	14	2428	1300
Finished Inventory	332	157		

Current Month's Production

Acceptable Fuel Elements (Tons)

<u>NATURAL</u>					<u>ENRICHED</u>					<u>Total</u>
<u>C</u>	<u>K</u>	<u>Reg.</u>	<u>Bumper</u>	<u>K5NS</u>	<u>C</u>	<u>K</u>	<u>Reg.</u>	<u>Bumper</u>	<u>K5ES</u>	
134.1	163.2	162.8	96.7	67.1	-	-	2.0	-	14.4	640.3

Per Cent of Forecast

92	101	115	121	85	-	-	-	-	51
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Manufacturing Yield

Current Month

94	90	87	82	81	-	-	95	-	72
----	----	----	----	----	---	---	----	---	----

Forecast

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

Previous Month

-	89	86	-	78	92	92	89	90	63
---	----	----	---	----	----	----	----	----	----

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Inventories

Bare Core Inventory - 1776 tons

Finished Fuel Inventory - 1474 tons

Work In Process

At the end of July there were 223 tons of material in process.

Special Products

Production of four-inch lithium-aluminum fuel elements continued in July and 1988 pieces were placed in finished storage.

Scrap

One shipment of N-Reactor Fuels scrap was shipped during the month, totaling 4.5 tons. One shipment of 420 empty boxes with lids was made.

Fuel Recovery

In July, the following fuel elements were processed through fuel recovery:

Eight-inch Regular	- 13,732
Watermix	- 412

Autoclave Failures

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

July AlSi Shop Equipment Overhaul

Considerable maintenance work was accomplished during the first two weeks of July while only six canning lines were in operation. The major pieces of equipment which were scheduled for overhaul and completed were: The component conveyor, the pickle machines, the bare core box conveyor, canning equipment and autoclaves.

Cleaning of Elliptical Rails

A hanger for use in processing rolls of elliptical rails through the can machine has been designed and fabricated. The hanger holds two rolls of rails and two hangers will fit on one can basket. This permits cleaning of the rails without special handling.

Component Preparation Rejects

The percentage of component preparation rejects was higher during July. The increased reject rate appears to be related to the materials furnished by certain vendors. This problem will receive further study during August.

Automatic Welder Improvement

In the past, considerable difficulty has been experienced with the proper indexing of the fuel element in the welder chuck. All adjustments were very critical and hard to maintain. A time-delay relay was placed in the indexing circuit to provide positive control over the retracting of the load-unload cylinders. With the installation of the time-delay relay, the performance of this equipment has been satisfactory.

Ajax Furnace Failure

On July 20, 1963, the Ajax furnace, Serial No. 1020, located in the 4-C position failed. This is the first failure of a duplex furnace since the initial start-up in 1954. The exact cause of the failure has not been fully determined. Present evidence, however, points to the channels being plugged. Prior to the failure there apparently had been no process problems, loss of temperature, or difficulty in holding process temperature. The manner in which the furnace failed initially led us to suspect a loss of power. Extensive checks of the electrical system, however, did not locate an electrical fault. Investigations to pinpoint the exact cause of the failure will continue. This failure could be indicative of an extremely serious condition with regard to future production continuity.

Automatic Welders - Gas System

The tank-type gas ratio controller purchased for use with the double spindle automatic welders has been installed for testing. Initial operation of the controller was unsatisfactory and it was determined that the vendor did not supply correct setup and calibration information for the gas mixture which had been specified. The vendor was contacted for the proper information, and the controller was readjusted. Since recalibration, operation has been satisfactory. This controller has sufficient capacity to handle the inert gas needs for the entire welding complex. It is expected that the present welders will be tied into this system at the time the double spindle welders are installed, thus eliminating the need for individual controllers at each welding station.

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FUELS ENGINEERING

RUPTURE EXPERIENCE

Four standard production fuel elements failed in the reactors during July 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 Bumper	1958-D	16	Side Mechanical Damage	7/1/63	3/22/63
Natural Bumper	2468-D	843	Side Unclassified	7/12/63	11/1/62
Enriched Non-Bumper	4050-KE	503	Side Hot Spot	7/22/63	4/12/63
Enriched Non-Bumper	3868-KW	801	Side Unclass.	7/30/63	4/16/63

Fuel performance trends were relatively unchanged during this period.

URANIUM TECHNOLOGY

As reported last month, excessive external braze porosity and bond test rejects have been experienced in the canning of several lots of natural uranium cores. Investigation has shown that this problem originated with cores shipped from the feed site about May 1, 1963. Cores shipped after June 13, and possibly dating back to May 20, appear to be of standard quality. Although the specific cause of the braze porosity problem has not been determined, the following information has been obtained from continuing studies of the suspect material:

- 1) The problem is highly ingot oriented. In a canning test run on natural cores from 50 ingots, over 70 per cent of the bond test rejects were from six ingots.
- 2) Ingots sustaining high metal quality rejects at the feed site are most likely to produce high bond test rejects. Unfortunately, this correlation is not good enough to reject cores on this basis.
- 3) No significant changes in the total hydrogen content are apparent during the period in question. Available core surface hydrogen data also show very little change.
- 4) Oil quenched natural cores were not affected.
- 5) Efforts at the feed site have shed no light on possible variations in core quality.

Additional canning tests are being made to select further natural ingot core samples for hydrogen analysis, metallographic examination, and degassing.

In order to demonstrate the capability of IPD to participate in trans-plutonium isotope (Pu 240) production, specifications were issued and an order was initiated for ten tons of depleted uranium cores. This material will be used to evaluate metal quality and in-reactor performance to high goal exposure. Dimensions of the cores and finished fuel elements will be the same as for the old reactor natural fuel model to expedite evaluation.

ALSI PROCESS DEVELOPMENT

Considerable effort was expended in an attempt to determine the cause and minimize the high external braze porosity reject rate experienced in the canning of natural uranium cores. Since the problem proved to be highly ingot oriented, core pickling and outgassing tests run on large production lot samples were inconclusive. Tests are currently underway to select affected core samples on an ingot basis for further study.

Based on further studies of fuel element weld closure porosity defects, it was concluded that the frequency of these defects is largely dependent on the amount of outgassing incurred in the weld zone. A total of 150 old reactor watermix fuel elements with acceptable end closure welds and 237 pieces rejected for weld voids was evaluated on the bond and braze closure integrity testers to determine if a relationship exists between fuel braze porosity and weld defects. The resulting variables data showed no difference in the two groups; however, this data may be inconclusive since small weld voids were observed in 66 per cent of the acceptable pieces under magnification. Possible effects of the hydrogen content of fuel component and braze media on weld porosity are being investigated. Analyses of ALSi canning bath samples indicate that the gas content does not differ appreciably from that observed in previous studies, ranging from 0.05 to 0.20 cc/100 grams of metal.

A fuels utilization authorization (FUA-IP-02-I) has been approved for the upstream charging of certain categories of fuel elements which are being routinely rejected or held in inventory. An estimated savings of \$35,000 will result from the use of material held in inventory and \$120,000 per year for the continuing program. Additional ALSi Shop and feed site savings, amounting to about \$270,000 per year, will result from a decision to reclaim ALSi slopover and uranium core small grain rejects for normal reactor charging rather than upstream charging.

Because of the high discharge forces (up to 3200 psi) and related problems experienced in the recent discharge of K-Reactor natural and enriched self-supported fuel columns exposed to 1200 and 500 MWD/T, respectively, a decision was reached to reduce the nominal support height (95 and 100 mils) of these fuel models five mils. Both the irradiation data and post-visual examination of natural self-supported

fuel elements exposed to 1200 MWD/T in KW-Reactor under a production test to determine the effects of eccentric fuel positioning, indicate that this change can be made without incurring excessive temperature imbalance or fuel cladding corrosion. Since the desired reduction in support height can be readily accomplished in the finished fuel sizing operation, arrangements have been made to reduce the support height of existing inventories of K-Reactor self-supported fuel, as well as future production.

Evaluation of three-in-one oil as an alternate lubricant for the soap solution applied to fuel elements prior to ultrasonic rail welding shows a significant reduction in weld time. Analysis of weld strength data has not been completed. Tests comparing the effects of rail fabrication on rail weld quality indicate a bright surface finish will yield a 10 to 20 per cent improvement in average rail weld shear strength over the standard mill finish. In addition, average rail weld shear strength is increased about ten pounds by the present method of fabricating rails from sheet stock transverse to rolling direction.

A program is being sponsored in the Hanford Laboratories to investigate techniques for identifying fuel elements after irradiation other than by existing differences in length. This will include: 1) oxide coatings, 2) self-coloration of the aluminum alloy, and 3) mechanical identification aids, such as a change in surface reflectivity and contour revision. Incentives for this program are for the use of natural and enriched fuel of comparable lengths.

During the month a total of 4,422 fuel elements was canned in the 306 Pilot Plant. Of this number, 3,800 were for reactor charging and the remainder for process development. In addition, 3,375 weld rejects were reclaimed, 3,580 fuel elements were nondestructively tested for Engineering, and 1,100 nickel plated cores were recovered.

ALTERNATE PROCESS DEVELOPMENT

Hot Die Sizing

Nondestructive and destructive testing of the natural self-supported, hot die sized fuel elements assembled last month, incorporating process revisions to improve closure integrity, were completed. The results confirmed that this material is of reactor grade quality. Use of thin AlSi wafers between the ends of the cores and cladding, combined with D.C. welding, produced excellent closures.

Twenty columns of the finished hot die sized fuel elements with AlSi control pieces were pre-measured and charged in C-Reactor on July 27 under a production test (IP-546-A) to compare irradiation behavior to 400 and 800 MWD/T exposure. Two full length columns of hot die sized fuel elements and one of AlSi controls were charged with thermocouple probes in the downstream end of the process tubes. Seventeen columns were alternately charged with matched hot die and AlSi bonded fuel elements in the downstream half of the tubes, with AlSi elements filling the upstream positions.

Development work was initiated to establish hot die process conditions for producing six-inch enriched fuel elements for irradiation testing. Thermocouple runs indicate the same bonding cycles can be used for this fuel model as used for eight-inch natural fuel elements. Confirmation based on bond strength and metallographic data is incomplete.

Drawings of seamless aluminum alloy tubing (with and without integral ribs) for the assembly of hot die sized fuel elements using wafers and suitable tube sizes have been prepared to obtain price quotations. It is expected that component costs can be further reduced by this technique.

Electroplating Nickel on Uranium

As reported last month, a reduction in pH was necessitated by excessive nitrate ion in the plating bath. Although average fuel element bond strength did not appear to be affected by the plating bath pH change or presence of nitrate ion, the minimum bond strength (as measured by the pull of a 3/16 inch diameter stud) decreased from about 600 pounds to 400 pounds. In addition, the proportion of bond fractures at the nickel-uranium interface increased from less than 10 per cent to approximately 30 per cent. Techniques for controlling the nitrate drag over to the plating bath are being investigated.

Evaluation of a plating cycle pretreatment variables test is in progress. Initial tests were completed of a modified plating rack, which effectively rotates the uranium core about its axis during plating. The results show a significant improvement in plate thickness control and continuity.

EQUIPMENT DESIGN AND DEVELOPMENT

Fuel Support Program

A firm date of August 2, 1963, has been received from one vendor for the delivery of "T" section rail samples. Support rails 1-7/8 inches long have been designed and fabricated for hot die sized enriched fuel models. This design will also be used for the present ALSi bonded C-Reactor natural uranium self-supported fuel model.

Possible use of a syntron vibratory feeder to orient and feed self-support rails into the ultrasonic welders is being investigated. Purchasing has been requested to obtain quotations on the necessary parts for a feeder previously ordered for bumper rails or on complete units. As an alternative, a roll of mylar polyester tape has been ordered to determine if the rails can be tape fed to the welders.

Modifications are being prototyped on the pilot plant automatic ultrasonic welder to reduce the effect of welder variables on rail weld quality. An air-operated friction brake, improved universal chucks and revised clamping devices have been installed to hold fuel elements more rigidly during welding and minimize rail alignment rejects.

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A prototype oil lubricant applicator is being fabricated for the AlSi Shop elliptical rail feeder. If the applicator performs satisfactorily, it will be adapted to the new self-support rail feeder being designed to use oil instead of the present soap lubricant.

Initial demonstration of a powered rail sizer indicates that self-support rails can be sized to a more uniform height by this method than with the existing contour block sizing dies. Work is currently progressing on rolls to reduce the nominal rail height of K-Reactor self-supported fuel models five mils and the design of an automatic load-unload mechanism for the roll sizer.

Aluminum Can Coating Equipment

Fabrication of a prototype machine has been completed to apply silicate solution to the outer lip of aluminum cans to minimize AlSi slopover rejects. Debugging and modifications are being made for production use.

Autoclave Basket Liners

Basic configuration and dimensions have been established for autoclave basket liners which are compatible with proposed automatic loading equipment. Vendor contacts are being made to determine design and fabrication feasibility.

Stuck Sleeve Study

A prototype pneumatic vibration technique has been demonstrated as a suitable method of removing stuck sleeves from assembled fuel elements. Design of a production unit has been completed for fabrication. Potential savings in the order of \$15,000 to \$30,000 per year will result from the elimination of marred surface rejects and damage to the sleeves incurred by manual removal of stuck sleeves.

Pilot Plant Activities

Necessary equipment modifications to establish pilot plant capability for canning ten-inch enriched fuel elements are 80 per cent complete. Steel dummies have been ordered to make final checks on equipment.

QUALITY CONTROLYield Control

	<u>June Yield</u>	<u>July Yield*</u>
Eight-inch I&E natural	89.0	90.8
Six-inch I&E enriched	90.5	99.3**
Eight-inch I&E bumpered	79.3	80.1
Six-inch I&E bumpered	98.3**	--
Eight-inch I&E self-supported	77.7	79.8
Six-inch I&E self-supported	99.2**	71.7

*Calculated from lots canned in July and completed by August 2, 1963.

**Reprocessed lots.

The over-all yield in July was 0.3 per cent higher than in June. The decrease in the number of fuel elements rejected because of defects in the cap end weld bead and because of insufficient cladding thickness was offset by an increase in the number rejected because of unbonded areas in the internal braze layer.

Dingot Uranium

Fifty-nine tons of dingot uranium cores were canned and finished this month with a yield of 85.6 per cent. The internal bond reject rate was higher than during previous runs in the current dingot canning program. The quality of the internal bonding layer is greatly influenced by the operation of the duplex furnace agitators during core submersion. Mechanical difficulties affected agitator operation on two canning lines during canning of these dingot cores.

Fuel Grading Program

The initial shipment of 1,200 fuel elements collected in the fuel grading program was sent to the reactors for charging into upstream process tube positions. These fuel elements were classified in the first three categories established for fuel element collection and identification under this program.

Hanford Test Reactor

Fifteen per cent of reactor operating time was utilized for special testing. The following services were provided:

- 1) Measured the relative blackness of six known value enriched uranium cores to determine reactor precision for Quality and Process Control Engineering, Production Fuels Section.
- 2) Measured the relative blackness of 36 inner and 35 outer enriched uranium fuel elements for N-Reactor Fuels Operation, N-Reactor Department.

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- 3) Measured the reactivity of four samples of aluminum-silicon alloy for Quality and Process Control Engineering, Production Fuels Section.
- 4) Measured the relative blackness of two natural uranium fuel elements for Quality and Process Control Engineering, Production Fuels Section.

Quality Control Standards

The Quality Control standards governing incoming inspection of uranium cores and aluminum components and the standard for closure welding were revised during July.

- 1) Standard F-101.0, "Fuel Core Inspection," was revised to include sampling of one core from each ingot for the enrichment testing program.
- 2) Standard F-201.0, "Can Inspection," was completely re-written to specify improved inspection procedures and to add dimensional standards for new fuel models.
- 3) Standard F-202.0, "Cap Inspection," was completely re-written to specify improved inspection procedures and to add dimensional standards for new fuel models.
- 4) Standard F-504.1, "Reclamation of Weld Rejects," was revised to permit reclamation welding of fuel elements rejected because of pits or porosity in the closure weld bead.

PLANT FACILITIES

Status of Active Construction Projects

CAF-954 - High Pressure Autoclave Development Facility

The customer organization is proceeding with cancellation of this project. A letter, W. E. Johnson to J. E. Travis, outlines the reasons for this action and disposition of the project.

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

The design contract has been awarded to Leo A. Daly Company of Seattle, and Title I work is underway.

CAF-973 - Steam Distribution Line Modifications - 300 Area

The construction contract was awarded to Central Plumbing and Heating on July 15, 1963. A revised project proposal has been prepared by RLOO-AEC to extend the directive completion date to February 15, 1964. This is an extension of two months to allow adequate time for completion of the contract.

CAF-979 - Pilot Scale Plating Equipment - 300 Area

Further bid complications have delayed the award of the design and fabricate contract for this project. Bid interpretation controversies and clarification of vendor replies have been received. Based on vendor delivery dates received during the bidding, the original directive completion date for the project still appears realistic.

CAI-994 - Utilities Extension - 300 Area

The design criteria were approved by RLOO-AEC and have been transmitted to Vitro Engineering Company, which will prepare the detail design.

CAI-107 - (Formerly CAI-997) - Boiler Replacement for Additional Steam Generating Capacity - 384 Building - 300 Area

The AEC directive approving interim funds for the design of this project will be issued August 1, 1963. The design will be assigned to Vitro Engineering Company.

Plant Conditions, Incidents, and Improvements

AlSi Shop

Automatic Welders - 313 Building

Final inspection of the equipment at the vendor's plant is in progress with shipment scheduled to follow immediately.

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Major Modifications to Ultrasonic Welders

Design is complete and preliminary purchase requisitions have been prepared to expedite procurement when the Appropriation Request is approved.

Conveyor Modification to Handle 4-Inch Material

A study is in progress on the cost of adapting a line to handle 4-inch material.

Coextrusion Shop

Billet Pre-Heat Furnace

Installation was completed as scheduled during the Coextrusion Shop shutdown, and startup is in progress.

Chemical Fume Stack Extension

The installation of this 60-foot stack extension on the 333 Building was completed on schedule. The total height above ground level of this polyvinyl chloride plastic stack is now 145 feet. Procurement of material, fabrication, and installation was completed in approximately five weeks after authorization, which represents expeditious handling of the job. The cooperation from the CPFF construction service contractor as well as HAPO personnel was outstanding, and the job proceeded smoothly to its conclusion.

Utilities

<u>Statistics</u>	<u>July</u>	<u>June</u>
Maximum steam generated (M lbs/hr)	52	57
Total steam generated (M lbs)	27,072	30,201
Total condensate return (M lbs)	2,221	5,314
Coal consumed (tons)	1,332	1,422
Evaporation rate	10.16%	10.61%
Efficiency - actual	79.5	84.4
Efficiency - optimum	82.5	86.2
Import sanitary water (M Gals)	128.7	138.2
Peak water flow (gpm)	5,200	5,600
Peak water consumed in 24 hours (M Gals)	5.1	5.1
Compressed air production (M scf)	40,616	44,866

The purchase order for the emergency generator for the powerhouse was placed June 28, 1963, with a required delivery date of January 15, 1964.

A project proposal is being prepared which will permit the utilization of PRTB waste steam within the 300 Area.

The overhaul of the No. 5 Boiler was completed, and it was placed in service. No. 4 Boiler overhaul is approximately 60 per cent complete, and work on No. 6 was started.

Design for a photo-electric control system for the sand separators at the 382 Building has been completed, and material has been ordered.

Craft Services

Major support from the sheetmetal craft was provided to N-Reactor Department in the 333 Building during their accelerated maintenance program the beginning of the month. Considerable overtime was required to complete this work on schedule.

Two power outages were scheduled and coordinated for the substation maintenance group to perform work on the switchgear and transformers. A portable generator was required to maintain essential service in the 306 Building.

The Fabricating Shop worked almost exclusively in support of the maintenance crews in the 313 Building during their accelerated program of overhaul work the first two weeks of this month.

Plant Services

Craft Training

All instrument and electrical trainee classes have been discontinued until September due to the heavy work loads and number of trainees on vacation.

Janitorial

The complete Floor Service operation has been documented on slides and tape. This audio-visual program will be used to train floor servicemen.

Manager, Production Fuels

W. N. Mobley

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RESEARCH AND ENGINEERINGPROCESS AND REACTOR DEVELOPMENTREACTOR FUELS

Forty-one self-support fuel columns of Production Test IP-586-AIE were discharged from KW Reactor during the outage of July 8, 1963. Exposures for thirty-six columns which were charged in February, 1963, averaged 1190 MWD/T; five columns which were charged in April, 1963, averaged 750 MWD/T.

High forces were encountered in discharging the higher exposure columns. Displacement-discharging of two columns revealed severe damage to the supports of the newly charged elements. Displacement-discharging techniques, therefore, were not used for the other high exposure fuel charges; these columns were discharged with perforated aluminum dummies and then charged with new fuel elements. The five normal-exposure, 750 MWD/T, columns were successfully displacement-discharged.

Seven self-support fuel columns of Production Test IP-572-A were discharged during the same outage at average exposures of 1240 MWD/T. These columns contained fuel elements with lower than normal support heights and discharge of the columns was accomplished without difficulty.

All forty-eight of these self-support charges were specially picked up and will be examined and measured in the 105-C Metal Examination Facility. Preliminary examination of the seven lower-support-height charges revealed moderate corrosion of the elements, with no accelerated localized attack present.

Twenty-six self-support enriched uranium fuel columns were also discharged during this outage. Higher than anticipated discharge forces were encountered on a few of these columns. These columns were specially picked up for post-irradiation examination.

REACTOR ENGINEERINGHazards Summary Reports

The last of two three-volume reports, discussing the operation and analyzing the hazards of the eight production reactors operated by the Irradiation Processing Department, was issued. The reports, HW-74094 Volumes 1, 2 and 3, and HW-74095 Volumes 1, 2 and 3, provide a hazards and accident analysis, process control and technical data, and physical description of the six smaller reactors and the K Reactors, respectively.

Zirconium Retubing Program - 100-K

Fourteen K-Reactor graphite channels (five in KE Reactor and nine in KW Reactor) have been measured after channel drilling operations and prior to Zircaloy-2 process tube installation. While for some channels the measurements show that the predicted amount of graphite was removed, measurements of the majority of

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STATUS REPORT OF PRODUCTION TESTS

Test No.	Type Metal	Tubes	Goal		Remarks
			Reactor	Exposure	
				Current Exposure	
IP-216-A	Normal prod. natural & enriched fuel elements	65	All	Normal variable goal	Provides for monitoring the performance of a sample of all normal production material to assist in development of a Quality Index for production fuel. Test is continuous.
IP-272-A	I&E self-supported fuel overbore size	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	0	KW	800 MWD/T	Provide qualitative data to confirm the fuel geometry design. No further testing under this authority is planned.
IP-572-A	I&E self-supported fuel	0	KW	800 MWD/T	Evaluation of effect on temperature distribution of eccentric placement on fuel elements in smooth process tubes. Test columns discharged on 7-8-63.
IP-586-AIE	I&E self-supported fuel	0	KW	1100 MWD/T	Evaluation of self-supported fuel element performance and fuel column discharge forces at extended exposures. Test columns discharged on 7-8-63.

the channels indicate that less graphite was removed than was expected on the basis of mock-up tests. No definite reason for the inconsistency between mock-up and on-reactor observations has been established, other than the possibility that tube block contraction has slightly exceeded filler block contraction which would permit the tube blocks to lift more than expected when the drilling bar passed through them.

Based on these limited measurements, the amount of stack contraction necessary to distort the Zr-2 tubes in the upper portion of the reactor to the point of KVNS fuel support interference is established to occur in seven to nine years. Other tests have shown that this time can be extended about three years if the fuel support height were reduced five mils.

REACTOR PHYSICS

Alternate Products

Brandy

The per cent of recycle fuel in the enriched fuel present in the reactors at the end of June and in the fuel discharged during June 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>
June 30 Status	~100	100	100	100	100	~100	100	100
June Discharge	100	100	100	100	100	a	100	100

a No enriched fuel discharged.

In spite of 100 per cent listings of recycled enriched fuel in the reactors (300-series designated fuel), there is no guarantee that some virgin material may not be blended with the recycled material at the supplier's plant.

Resolving local and supplier's analytic results on uranium isotopic content is being attempted by sending duplicate samples to Oak Ridge and the Hanford Laboratories. No results have been received to date. Along with this problem is that of studying and measuring the buildup and burnout of uranium-236 and neptunium-237.

Polonium-210

A report is being prepared on the Po-210 production studies, and will be completed early in August. Included in this report will be full and partial reactor loadings and test hole loadings.

E-D Loading

The production of 200 kilograms of 18 per cent Pu-240 plutonium from 0.2 per cent depleted uranium, supported by .947 per cent enriched uranium

appears to be feasible from a physics viewpoint. The number of enriched columns/depleted column will vary from 3.45 green to 1.80 at 1600 MWD/T goal exposure in the depleted. This requires 112 tons of depleted uranium, which will make about 952 D columns, supported initially by 3,284 E columns, for a total of 4,236 columns. The irradiation period will be about 395 days.

The E-D load gains about the same amount of reactivity upon water loss as a natural uranium load. The E-D load at goal exposure has a graphite coefficient a factor of two above that normally experienced in a natural load at 250 MWD/T. Consequently, the reactivity gain from cold to hot operating will have to be controlled by supplementary poison, especially at higher exposures. Even so, startups would have to be slower than usual in order to control this reactivity gain with temperature rise. Such a procedure could lead to increased non-equilibrium losses.

Flux and Gamma Decay Measurements - KE Reactor

Production Test IP-596-A was written and the test run at 12:16 A.M., July 1, 1963, at KE Reactor. The reactor was manually scrammed from equilibrium power at the beginning of a scheduled outage. Neutron flux and gamma decay measurements were obtained. A log pico-ammeter was used to measure the #4 Beckman chamber output. Additional neutron measurements were made with the #1 Beckman and a higher speed recorder; the octant chambers, the low level neutron monitors, and a gamma compensated test chamber. By special circuitry, a measure of the gamma component was made with the compensated chamber. Temperature of tube 2370 and bulk outlet were also recorded. A report is in preparation showing the results of the test.

Quarrying Basalt Rock

A 1/10 scale powder charge of 4,000 pounds was detonated at 5:34 p.m. on July 1, 1963. Measurements were made on the export line to 200 Area, at 105-KE, and at a site 15,000 feet from the blast, between K and N Areas. No indications were shown on the 105-KE recordings. From the information obtained to date, no problems of seismic reactions are expected from the full scale blast of about 20 tons of explosive.

RADIOLOGICAL ENGINEERING

Radiation Control Experience

The following table summarizes the radiation exposure experience of critical IPD classifications through the first 24 weeks of the 1963 badge year:

<u>Classification</u>	<u>Total Dose</u>	<u>No. of Employees</u>	<u>Average Dose/Employee</u>	<u>Extrapolated Year End Average</u>	<u>No. of Employees over 3r Extrapolated Exposure</u>
Radiation Monitors	110492 mr	80	1381 mr	2991 mr	46
Processing Operators	297263	253	1175	2545	70
Pipefitters	158860	128	1241	2688	47
Millwrights	125935	104	1211	2623	52

Contamination was spread from the 105-KW-B retention basin which had been allowed to dry out for repair work. The spread was discovered on July 11, 1963 when shoe contamination was picked up by employees within and in the vicinity of the 1717-K maintenance shop. The wind was from the northwest, which placed the building on the centerline of the contamination path. Contamination entered the building, with floor smears reading up to 4,000 c/m, and to a lesser extent entered the 1704 and minor construction buildings. The particle density on the ground near the 1717-K building was 17 particles per 100 square feet. In the vicinity of the 100-K main gate, the density was seven particles per 100 square feet. The average activity level for the particles was 5,000 c/m, with the maximum being 90,000 c/m. The floor of the retention tank was kept wet, the buildings were decontaminated, and all contaminated asphalt surfaces were hosed with water. The shoes of all personnel, and all vehicles were checked upon leaving the area through 8-4 shift on July 12. Contamination cases were limited to those found on the first two shifts of July 11.

Lapse of Radiation Control

Distribution by Reactor and Component

	<u>B</u>	<u>C</u>	<u>D</u>	<u>DR</u>	<u>F</u>	<u>H</u>	<u>KE</u>	<u>KW</u>	<u>IPD Totals</u>
Processing		2		1	1			4	8
Maintenance		2	1	1				1	5
Suppl. Crews								1	1
Special Outage Service									0
Central Maintenance									0
Research & Engr.									0
Facilities Engr.									0
Applied Reactor Engr.		1							1
Reactor Area					1	1			2
IPD General									0
Assigned Totals	0	5	1	2	2	1	0	5	16

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

Effluent Activity

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

<u>Reactor</u>	<u>P³²</u>	<u>As⁷⁶</u>	<u>Zn⁶⁵</u>	<u>Np²³⁹</u>	<u>Cr⁵¹</u>
B	1.6	58	1	100	230
C	8.2	114	8	110	480
D	7.9	120	6	170	510
DR	2.2	75	7	110	270
F	10.0	70	9	100	220
H	9.0	76	7	100	290
KE	8.2	55	10	120	330
KW	10.0	59	11	120	330

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All reactor plants except 100-F, 100-KE and 100-KW continued the nominal high alum feed rate, 18 ppm. Under a production test, alum was added to the far side 100-F coolant at one-third of the nominal rate. Coolant for both 100-K Reactors was treated with alum at about two-thirds of the nominal rate.

Steps were taken to reduce the coolant pH to 6.6 at B, DR, F, and H Reactors during June, 1963. At month's end, the coolant supplied to the near side of D Reactor was the only 7.0 pH water being used. During the month, the concentration of sodium dichromate in coolant at B, DR, F, and H Reactors was increased to 1.8 ppm. The water supplied to the far side of C Reactor continued as the only coolant containing a 1 ppm sodium dichromate concentration.

PROCESS TECHNOLOGYREACTOR POWER LEVEL LIMITATIONS

Power levels at all reactors were restricted by a bulk outlet temperature limit during the report period. The restricting bulk outlet temperature limit at B, C, DR, KE, and KW was 95 C; 93.5 C at F; and a nominal 93.5 C at D Reactor.

PROCESS STANDARDSHW-46000 B, Process Standards - Reactor

Five standards were deleted during the month. These were:

Process Standard F-050 - "Poison Column Control Facility"

Process Standard F-060 - "Operational Charge-Discharge Facility"

Process Standard F-070 - "Operational Charge-Discharge Facility"

Process Standard F-080 - "Operational Charge-Discharge Facility"

Process Standard F-090 - "Operational Charge-Discharge Facility"

These standards were deleted since the facilities have been eliminated from B and C reactors.

HW-46000 F, Process Standards - Reactor

One standard was deleted during the month. This was:

Process Standard F-050 - "Poison Column Control Facility"

This standard was deleted since these facilities have been removed from F Reactor.

HW-46000 K, Process Standards - Reactor

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

Process Standard A-022 - "Bulk Outlet Water Temperature Limit"

Bulk outlet water temperature limits were revised to take account of the flow change following a pump shaft break with the modified impellers installed on Project CGI-883. A requirement that three Zone #1 Panellit gauges be maintained within 15 psig of low trip was added to gain assurance of a prompt reactor scram following a pump shaft break.

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HW-78451

Process Standard A-070 - "Thermal and Biological Shield Cooling Water"

This standard was completely rewritten. The major changes are:

1. Fringe tube power limits were deleted.
2. Top thermal shield temperature limits are 260 C for the hottest thermocouples and 200 C for the remaining thermocouples with a 20 C overrun permitted before a reactor shutdown is required.
3. Flow may be removed from the thermal shield after graphite temperature is below 200 C instead of the previous 100 C limit.
4. Lower shield temperature limits must be used if coolant flow to a tube is lost.
5. The minimum foundation temperature limit, 25 C, applies only after four days of reactor operation.
6. Process water may be used as a backup to the bottom thermal shield.

Process Standard C-110 - "Ball 3X System"

This revision provides an LP and VLP trip setting that is appropriate for both five and six-pump operation.

PROCESS CHANGE AUTHORIZATIONS

Nine Process Change Authorizations were issued during the report period: seven to permit deviation from Process Standards - Reactor, HW-46000, one to permit deviation from Process Standards - Water Plant, HW-27155 Rev 1. and one to permit deviation from Process Equipment Standards, HW-41000. These were:

PCA #3-60 - "Nonrotating Visi-Gauges, Thermal Shield Loop - B Reactor"

Authorization was given to operate B Reactor with 20 nonrotating visi-gauges when assurance was gained that all thermal shield cooling tubes had flow.

PCA #3-61 - "Water Shutoff Times - F, D, DR, C, K Reactors"

This PCA extends the provisions of PCA #2-163 to allow additional time to obtain the necessary information for a standard revision. PCA #2-163 required that water shutoff times for nonstandard process tubes be obtained from Process Technology.

PCA #3-62 - "Photocell C-Work Platform Interlock - B Reactor"

Operation of the front-face work platform without automatic obstruction protection was authorized provided manual obstruction protection was employed.

PCA #3-63 - "Graphite Temperature Limit Exceeded - F Reactor"

This process change authorized operating the reactor for 12 hours with graphite temperatures no more than 10 C above the limit since no increased burnout would be expected under the prevailing conditions.

PCA #3-64 - "Faulty Thermocouples - Thermal Loop - K Reactors"

Extension of PCA #2-151 was necessary to provide additional time for replacement of faulty thermocouples. PCA #2-151 specified provisions for reactor operation with faulty thermal shield coolant tubes thermocouples.

PCA #3-65 - "Graphite Temperature Limit Exceeded - D Reactor"

Operation of D Reactor with graphite temperature no more than 15 C above the limit was authorized for a seven-day period.

PCA #3-66 - "Emergency Removal of Steam-Driven Export Pump - B Reactor"

This process change authorized removing the steam-driven export pump at B Area from service provided two other steam-driven pumps were placed in operation on the export system and DR Reactor remained shut down with front crossheaders throttled.

PCA #3-67 - "Alternate Tube Charge Cooling - DR Reactor"

Authorization was given to remove the water supply to one crossheader provided temperatures of irradiated charges would not increase beyond 450 C if water were shut off for infinite time and were supplied coolant from an alternate source.

PCA #3-68 - "Loop Header Thermohm - D Reactor"

An alternate temperature measuring device was authorized for measuring far side loop header outlet temperature during the period that the thermohm was out of service.

PROCESS ASSISTANCE

One engineer audited conformance to process standards on all Processing Operations' shifts by making 17 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>
7-1-63	1958-D	KD-058-D ¹	I&E NB	1142	16	SD

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

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HW-78451

<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>
7-12-63	2468-D	KZ-533-G	I&E NB	1085	843	SU
7-22-63	4050-KE	KK-362-A	I&E E (0.94%)	1694	503	SH
7-30-63	3868-KW	KK-375-A	I&E E (0.94%)	1711	801	SU

Legend

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

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

First Character

S Side - Failure occurred on the side of the fuel element.

Second Character

D Mechanical Damage - Failure caused by mechanical damage to the fuel element.

U Unclassified - No other character logically applies to the failure.

H Hot-Spot - Failure caused by accelerated high temperature corrosion attack.

OPERATIONAL PHYSICS

Good flattening efficiency and minimal startup losses at all reactors helped to compensate for an unusually high frequency of outages; minimum outages were averted by successful scram recoveries following five of the numerous unscheduled outages. Record operating runs of 61 and 45 days were attained at the H and KW Reactors, respectively.

Experience with aluminum-clad splines at several reactors has thus far been satisfactory.

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

Reactor	B	C	D	DR	F	H	KE	KW
ECT in July (1)	1490	1660	1485	1540	1525	1515	2490	2450
12-Month Average ECT	1505	1645	1495	1500	1490	1505	2485	2520
Equil. Scram Time (2)	15-20	20-25	12-15	16-18	15-20	25-30	20-25*	25-30*
Recording Time								
From:	6-18	6-18	6-19	6-18	6-17	6-18	6-17	6-17
To:	7-22	7-19	7-22	7-22	7-22	7-22	7-22	7-19

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

- (1) Effective Central Tubes: This value is defined as pile power level divided by the average power of the ten most productive tubes in the reactor.
- (2) This is defined as the maximum time which may elapse between scram and first indication while still permitting a successful scram recovery.

B Reactor - J. R. Fredsall

Operating continuity was interrupted several times during the month, with several cold startups and one successful hot startup. Fringe poison was added in the top and far side to keep shield temperatures from becoming limiting during anticipated high-CO₂ operation (under PT IP-593-J for operation at higher graphite temperatures). Due to operational scheduling problems, immediate enrichment compensation was incomplete and a short interval of reduced ECT resulted until the next outage when enrichment compensation was completed.

A new HCR configuration was introduced in an attempt to reduce rupture potential; no significant improvement in longitudinal flux distribution was noted. Number 2 half-rod was out of service, and the loss was compensated by poison splines; failure to make an ensuing hot startup was at least partially attributable to absence of the rod.

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C Reactor - P. D. Gross

A hot startup was made successfully following one of the pressure-monitor trips experienced during the report period. A hopper of balls was dropped on July 1st with recovery apparently complete.

Two items of initially-unexplained reactivity increases are currently being investigated: 1) an unexpected gain was indicated by all major instruments at low-level-holding during a recent startup; immediate operator compensation resulted in a flux-monitor low trip; 2) reactivity increases have been observed following several routine diatomaceous-earth purges. Neither case has resulted in large reactivity increases.

D Reactor - G. D. Baston

The report period was characterized by considerable nonequilibrium operation resulting from a large number of startups (including one successful hot recovery); the outages were caused by varied component problems. Power level was generally restricted by bulk outlet temperature, but some difficulty was encountered with local graphite temperatures. A suspect graphite stringer was replaced during the last outage in the report period; this, plus spline and enrichment loading changes, has apparently eliminated local graphite temperature limitations.

Loading and control measures were necessary to compensate residual water-leak reactivity effects during the startup of June 29.

DR Reactor - S. M. Skidmore

Operating continuity was fairly good during the report period. During the scheduled outage of July 9 a large (40 per cent) fuel discharge was made using the alternate-row plan. During the outage of July 17 a far-side former PCCF channel was retubed and returned to service as an active uranium column, along with two other channels previously containing solid aluminum.

F Reactor - A. W. Medcalf

Good operating continuity and low nonequilibrium losses were experienced during the report period. A shutdown on July 15 terminated 25 days of continuous operation with good flattening efficiency.

Two aluminum-clad splines with more than two weeks reactor residence which were examined showed no significant deterioration.

H Reactor - E. L. Conner, Jr.

A record operating period of 61 continuous days and over 100,000 MWD production was terminated on July 19 by a shutdown for eliminating a water leak. The entire two-month period was characterized by good operating stability.

The next block discharge is scheduled for September 5. Exposure of the core averaged about 650 MWD/T at time of the July 19 outage.

KE Reactor - D. G. Albertson

Operation during equilibrium periods was stable, but continuity was interrupted by several shutdowns. Several aluminum-clad splines were used with good success; their use is expected to decrease the frequency of "no-go" spline cap instances observed at KE in the past.

KW Reactor - R. A. Chitwood

July 8 marked the end of a record production period of 45 days of continuous operation and over 190,000 MWD production. During the period ECT was slightly below normal, partially because of the effort to accommodate uranium discharge scheduling. Following the startup several scrams were caused by flux-monitor trips and one outage was manually initiated due to high local tube temperatures in the lower part of the reactor. Number 19 HCR, removed last month, was returned to service on July 8; its return is expected to minimize such localized temperature problems. The new probe holder recently designed for spline traverses is now in service and working quite well.

PROCESS PHYSICS STUDIES

Reactivity and Safety Control Studies

Computer runs for use in establishing necessary Zone Temperature Monitor grid geometry have been completed. Results are being interpreted, and conclusions will be documented.

Data obtained from various nuclear instruments during a recent deliberate scram at the KE Reactor (PT IP-596-A) are being examined for use in updating hot startup approach-to-critical bases. It is expected that "apparent" period indications from the subcritical monitor can be satisfactorily used for defining procedural limitations during hot startups (as they are already used for cold startups).

Calculations of temperature-power effects of HCR withdrawal at equilibrium power, and the xenon-override core uncompensated by supplementary control, show that basic safety criteria will be met within present standards covering flux-monitor trips. Although the control rods would be worth more per increment withdrawn in the override case, the peaked flux distribution would be well defined and not subject to the normal degree of distortion due to rod movements. These results imply that no reduction in the potential mechanical rate of HCR withdrawal would be necessary in the xenon-override case.

Control Efficiency Studies

Production Efficiencies for the second quarter of 1963 averaged 80.0 per cent at the B, D, DR, F, H Reactors and 70.0 per cent at the C and K Reactors compared to 62.9 and 76.8 per cent respectively, during the same period in 1962.

113

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HW-78451

These figures include effects of startup efficiency, level-operated efficiency, and time-operated efficiency. The 70 per cent C and K figure has been affected by zirconium tube outages at the K Reactors.

Startup losses for the first half of 1963 averaged 0.25 equilibrium day per startup at the B, D, DR, F, H Reactors and 0.28 day per startup at the C and K Reactors. The plant average of 0.27 day per startup compares favorably to the 0.34 day loss per startup for the equivalent period of 1962.

Shield Protection Studies

To counteract the higher shield temperatures expected with operation at higher graphite temperatures under PT IP-593-J, the shield-protection poison loading at B Reactor has been expanded in both the top and far side fringe layers.

An uncooled shield plug has been designed for a C Reactor test hole in conjunction with an irradiation testing facility. Because of the high temperature loop to be used in the facility, a local increase in surrounding biological shield temperatures is expected which might exceed Process Standards. The expected use time of the facility is about one year. It is tentatively planned that thermocouples will be installed on the step plug to provide data for a later decision as to whether or not special cooling should be provided.

Reactor Fundamentals Training

Effort has been placed on developing training aids to supplement the booklet "Reactor Operating Physics" for assisting in-building training by reactor supervisors.

TESTINGIRRADIATION TESTING

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	34	Washington Designated Program
KW	2A	Quickie			
KE	2D	Quickie	HAP0-256	1	Plutonium (fission yields of heavy plutonium isotopes)
KW	2A	Quickie	HAP0-252	3	Arsenic (tracer isotope production)
KE	0065	General Purpose	NAA-115	1	Flux monitors (determination of flux levels and energy in bottom test hole)
KW	4B	Snout	NAA-115	1	Flux monitors (determination of NAA-115 shroud tube thickness)
KE		Process Channel	HAP0-098	30	Graphite (burnout rate study)
B		Process Channel	HAP0-098	30	Graphite (burnout rate study)
C	Y	Bare Channel	HAP0-117	1	Graphite (radiation damage study)
F	E	Quickie	HAP0-219	4	Strontium (tracer isotope production)
KW	2A	Quickie	Reed College	2	Tissue (cancer research project)
KW	3A	General Purpose	HAP0-236	4	Zirconium (creep rate study)
KW	3B	General Purpose			
KW	4C	Snout	HAP0-243	4	Iron (fast neutron damage study)
F	E	Quickie	HAP0-249	14	Various flux monitors (flux monitor development)
D		PCCF	HAP0-283	8	Thorium (U 232 buildup of various grades of commercial thorium)
DR					
		*Gamma	HAP0-171	2	Plastics and rubber (damage study)
		Gamma		3	Seal bushings (damage study)
		Gamma		2	Bellows foam (damage study)

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

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Vertical Bowing - Vertical displacement measurements were taken as follows:

Traverse channel Z1-KE	Up 0.31" at 7' since 7-11-62
	Up 0.22" at 34' since 7-11-62
Traverse channel Z5-KE	No change since 7-11-62
Traverse channel Z2-KW	Down 0.91" at 25' since 1-9-62
Traverse channel Z3-KW	Down 1.41" at 25' since 1-9-62
Traverse channel Z4-KW	Down 0.70" at 29' since 1-9-62
Horizontal control	
rod channel 19-KW	No previous data
Horizontal control	
rod channel 2-DR	No previous data
Process tube 4674-D	Down 0.06" at 9'2" since 2-4-63
	Down 0.15" at 22' since 2-4-63
Process tube 4473-D	Down 0.08" at 10' since 2-4-63
	Down 0.17" at 22' since 2-4-63
Process tube 4496-D	Down 0.02" at 9'8" since 2-4-63
	Down 0.12" at 22' since 2-4-63

Spline Traversing - Front-to-rear flux distribution data were obtained from the several reactors as follows:

<u>Reactor</u>	<u>No. of Tubes</u>
B	11
C	6
DR	4
KE	6
KW	5

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

<u>Reactor</u>	<u>Channel or Tube</u>	<u>Movie Record</u>	<u>Purpose</u>
KW	Process tube 3361	No	Stuck charge
D	Process channel 3482	No	Maintenance support
DR	VSR 10 and 41	Yes	HCR-VSR channel problem
KW	HCR channel 19	No	HCR-VSR channel problem

H-1 Loop Operation - Development Test IP-590-D, Chemonuclear Experiments in the H-1 Loop, Demineralized Water, was completed with negative results. The hydrogen peroxide content of the water decreased with operating time when it was expected to increase. A reason has not yet been found to explain this decomposition.

COMPONENT TESTING

Irradiated IPD Fuel Element Examination, 105-C Facility - Examinations were completed on fuel elements from 27 tubes requiring 86.4 fuel examination units. Individual examinations completed were 3076.

<u>No. of Tubes</u>	<u>Production Test</u>
2	IP-216-A, Evaluation of Normal I&E Fuel Element Performance
15	IP-549-A, Half-Plant Low Alum Feed Water Treatment at F Reactor
5	IP-572-A, Effect of Eccentricity on the Irradiation Behavior of KVNS Fuel Elements
5	IP-592-A, Discharge and Examination of Fuel Elements From Fringe Tubes at D Reactor

Because of the scheduled outage for Basin II bulkhead and underwater door installation, examinations were made on only eight of twenty-two days available. Photographs were taken of three ruptured fuel elements.

Irradiated NRD Fuel Examination, 105-KE Facility - No fuel was examined.

Irradiated Process Tube Measurements

<u>Reactor</u>	<u>Tubes Measured (WTG)*</u>	<u>Report Number</u>	<u>HW Number</u>
F	197	41	78036
KE	59	42	78126
C	31	43	78127
B	57	44	78152
KW	34	45	78289
DR	96	46	78309
B	214	47	78341

*Wall thickness measurements made with eddy-current type wall thickness gauge.

In-reactor measurements (annulus top and bottom, wall thickness top and bottom) of nine B-Reactor process tubes were obtained with the sector-annulus gauge (SAG). Three C-Reactor tubes were measured with the sector gauge.

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

<u>Reactor</u>	<u>Number of Tubes</u>	<u>Reason Examined</u>
D	2	Corrosion evaluation
F	1	Leak suspect

Critical Reactor Component Examination - All KW Reactor front-face tube sleeve retaining rings were examined. None were broken and no ring sections were missing.

Nine F Reactor outlet tube flanges which had failed were examined. The outlet flange of tube 4287-B was examined to determine rib location.

Panellit Systems Programs

Gauges repaired, calibrated by Maintenance	-	33	
Gauges meeting calibration criteria	-	10	(30%)
-previous month	-		(76%)
In-board gauge reliability examination	-	483	
Gauges meeting examination criteria	-	478	(99%)
-previous month	-		(98%)
-average for past year	-		(96%)
Response time determination	-	483	
Gauges meeting response criteria	-	483	(100%)
-previous month	-		(99.6%)
-average for past year	-		(99.8%)
In-board Bourdon coil examination	-	0	
Non-leaking coils	-	0	
-average rate past two years	-		(99.8%)
Gauges receiving failure analysis	-	29	
2B-X1 switch examination	-	669	
-acceptance rate	-	579	(87%)
-previous month	-		(85%)
Gauges received from vendor and examined	-	595	
-acceptance rate	-	526	(88%)
-previous month	-		(91%)

Gauges removed from panels to permit installation of new gauges and prepared for shipment to the vendor as exchange gauges totaled 588.

Central Maintenance started Panellit gauge pivot-bushing replacement July 1 (KE, KW, H Reactors). Gauges received and examined - 207
 -acceptance rate - 163 (79%)

COOLANT TESTINGKER Loop Operation

KER-1 - Testing of eight 9-inch lithium-aluminum target elements with five 17-inch NIEL fuel elements as authorized by PT IP-584-D continued. The purpose of the test is to evaluate target element swelling characteristics and lithium and tritium migration at conditions approximating those expected at N Reactor. The inlet nozzle-to-tube joint leak was repaired during the July 1 outage and one 17-inch NIEL fuel element was added to the charge.

KER-2 - Two 17-inch NIEL fuel elements were added to the charge during the July 1 outage, and testing of eight lithium-aluminum target elements with

six NIEL fuel elements as authorized by PT IP-584-D continued.

KER-3 - Testing of thirteen 23-inch NAEL 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.

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

Legend

NIEL - N Reactor, inner tube, enriched, first model
 NAEL - N Reactor, assembly - tube and tube, enriched, first model
 NINL - N Reactor, inner tube, natural, first model
 KSE3 - KER Loops, single tube, enriched, third model

Single-Pass Tube Operation - 1706-KE

<u>Tube</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-555-A	Service	10 ppm silicate	6.6
*SP-3 (4355)	IP-520-A	Pilot Plant	1.8 ppm dichromate	7.0
	Supplement A			
*SP-4 (4456)	IP-520-A	Pilot Plant	1.8 ppm dichromate	7.0
	Supplement A			
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-449-A	Deionized		
SP-8 (5063)	IP-449-A	Deionized		

*Aluminum nitrate used as flocculating agent in place of alum and nitric acid for pH control instead of sulfuric acid.

KE Reactor Outage Time Requirements - Two unscheduled reactor outages were charged to production testing. On July 10, the KER-2 dump valve operator diaphragms ruptured and resulted in a reactor scram. On July 14, the diaphragm on the KER-4 emergency storage tank air-operated valve ruptured and resulted in a reactor scram. The diaphragm rupture resulted from the failure of the pressure regulating valve through which compressed air was supplied. A total of 75.7 outage hours was charged to production tests as listed below.

<u>Production Test</u>	<u>Description</u>	<u>Hours</u>
IP-477-A	Reactor scram - July 14. Repaired KER-1 front-face crossheader leak and pressure tested.	36.3
IP-584-D	Reactor scram - July 10. Pressure tested all KER loops and installed front face identification tags on all single-pass tubes.	33.2
IP-477-A	Repaired KER-4 influent temperature RTD.	0.4
IP-584-D	Repaired KER-1 front-face nozzle leak, charged additional fuel elements into KER-1 and KER-2 and pressure tested both loops.	5.8

Out-of-Reactor Facility

TF-1 - Decontamination testing to determine the effect of extended decontamination solution contact times and extended periods of high temperature operation on various decontamination processes was completed.

TF-3 - Testing to evaluate crevice corrosion beneath Zircaloy-2 fuel element supports when ammonium hydroxide is used for pH control was started. Operating conditions are 598 F, 1985 psi and pH 10.0.

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

TF-5 - The test to determine the corrosion rates of carbon steel and stainless steel in water containing 30 to 70 cc/liter hydrogen was terminated.

TF-7 - Testing for the primary purpose of further evaluating fretting corrosion of various materials continued. The operating conditions are 530 F, 1125 psi and pH 10.0. The test sections contain the following materials:

1. A PRTR fuel element with an end bracket design employing a full 360 degree contact area with the process tube for fretting corrosion studies.
2. Two dummy Zircaloy-2 clad elements for uniform corrosion testing of supports.
3. Two NIN1 fuel elements for uniform corrosion testing.
4. One KSE3 fuel element for uniform corrosion testing.
5. Two 23-inch MAEL fuel elements for support fatigue and fretting corrosion testing.
6. Three coupon holders containing 304 stainless steel coupons for stress corrosion testing.

TF-13 - The heat transfer studies were terminated.

TF-15 - Corrosion testing at operating conditions of 1100 F, 3300 psi and pH 9.0 with ammonium hydroxide and hydrazine added was terminated.

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

Design Test 1134 - Hydrostatic Cycling of NPR Pipe and Heat Exchanger Tube Sections - Testing of the twenty-second pipe section specimen was completed. Five NPR heat exchanger tube specimens were tested and testing of a sixth specimen is in progress.

 Manager, Research and Engineering

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FACILITIES ENGINEERING

DESIGN ENGINEERING

Vertical Safety Rods - Graphite Distortion

Additional mockup testing of the VSR channel graphite reamer has been successfully completed. During the test, averaging of the distortion in the channel was very good, with a minimum amount of overcutting occurring in regions of offsets and sharp curvatures. Channel liner blocks were installed in the mockup without difficulty. Examination of the enlarged channel indicated that no process tube channels were penetrated by the reamer, the nearest approach being 3/32 inch from the tube block bore.

A "total information" VSR probe has been designed and fabricated to measure the location of all four walls of a VSR channel. The probe was tested in a mockup of No. 28-C VSR channel with limited success. More than half the readings agreed with layup data within .060", which is the sum of the expected errors of the probe and mockup. Readings outside of this tolerance were assumed to be due to cocking of the probe. To correct this, a transparent bubble balance has been mounted in the center of the target.

Laboratory work evaluating the effects of radiation damage to various ceramic materials is continuing. At an exposure of 5000 MWD/AT there appears to have been no change in the compression strength of the SiC and AlSiO₂ samples. The compression strength of the Al₂O₃ samples appears to have increased about 25 per cent after 5000 MWD/AT exposure. Analytical studies to determine the thermal expansion forces produced by individual graphite blocks in the reactor moderator stack have been initiated.

183-K Bauxite Feed System

A design basis document outlining the process and functional requirements for this proposed system in support of a project proposal submission to RLOO-AEC has been completed and approved by the Project Representatives and Design Council.

Permanent Facilities for Low pH Process Water

An assessment of the information currently available indicates that there is inadequate justification at this time for providing facilities for acid addition differing from those currently being utilized. There is no information available at this time which would indicate that a significant degree of increased corrosion may be expected in the water plants and coolant piping systems as a result of a pH reduction from 7.0 to 6.6. A letter report has been received from Dr. E. L. Knoedler of Sheppard T. Powell and Associates, who performed an independent evaluation of this problem, which essentially arrives at the same conclusion. No additional preliminary engineering effort is planned on this program until further corrosion data are accumulated.

105-K Reactor Zirconium Tube Program - Design

Studies have been completed of alternative methods of alleviating the stuck rear gunbarrel problem encountered at the 105-K Reactors during the last zirconium retubing program outages. These studies have indicated that the most advantageous solution to the problem is the installation of short, 3/4" gunbarrel keys in the inlet nozzle assemblies above row 30. Agreement has been reached with the Program Representative that a test installation of the short key will be made on all assemblies on row 31 at 105-KW Reactor during the August retubing outage. The purpose of this test is to evaluate the field problems which may be encountered in the removal and replacement of the inlet gas tubes. A Development Test authorizing this installation is currently circulating for signatures.

Tests have been completed on production lot samples of aluminum Van Stone gaskets. These tests indicate that the aluminum Van Stone gaskets have adequate water sealing ability of 60 ft/lbs. bolting torque with 5 mil scratches on the gasket or nozzle sealing surface. These gaskets also have adequate resistance to extrusion at the specified bolting torque. The installation of these gaskets on the inlet and outlet of all zirconium tube assemblies has been authorized.

Evaluation of Radioactive Materials Shipping Casks

The evaluation of all off-site shipping casks currently utilized by the Department for compliance with the established cask design criteria has been completed. None of the casks evaluated met the criteria primarily due to their inability to withstand impact and fire conditions. A design program for the improvement of these casks has been initiated.

190 Building Storage Tank Painting

The surface condition of the 190 Building tank walls has made it advisable to re-assess the various coating systems proposed earlier. Tank wall samples have been submitted to various vendors for analysis and coating system proposals. Proposals have been received from three vendors. These proposals have been evaluated by GE-HAPO, and, in turn, sent to the Bureau of Reclamation in Denver through RLOO-AEC for their analysis and possible recommendations. The Bureau office was chosen because of their long and varied experience in successful application of coating systems for internal piping protection.

Gravity Fed Water Supply to Reactor Storage Basins

A design criteria document in support of project proposal submission to RLOO-AEC has been completed and approved by the Project Representatives and Design Council.

EQUIPMENT DEVELOPMENT

Self-Supported Fuel Element (SSFE) Charging

Delays and prolonged charge-discharge periods may be expected for the balance of the zirconium tube installations at the K Reactors because of the on-the-job operator training and operating problems with the new machines, and because of data gathering to determine solutions to problems. Use of interim equipment will be longer than planned due to delays in project funding.

The Mark II prototype charging machine will not be delivered as promised on August 12, 1963; 18 days delay is expected. The Pacific Steel Products charging machine is being revised to be used as a spare.

A high-force ram seater has been designed and fabricated for use in discharging SSFEs showing high retarding forces in the zirconium tubes, and is undergoing initial tests.

The order for 200 magnesium SSFE magazines with plastic insert strips is being assembled in the vendor's plant. An order for 400 prototypical all-magnesium magazines is being processed. General Electric, Packaging and Development Laboratories, is developing and molding expandable polystyrene fuel element magazines for testing with the new SSFE charging machines; ten prototype magazines of various designs are promised by September 1.

Prototype High Speed Scanner

No unusual conditions were experienced in the high speed scanner; there is indication that several input switches are erratic.

K Reactor Resistance Temperature Detector (RTD) Corrosion

A few exploratory laboratory tests were made on the galvanic properties of various materials in several liquid solutions related to RTD installations. The variable and occasionally contradictory results from these tests point out the sensitivity of the phenomena and the need for further controlled laboratory tests and on-reactor measurements. Samples of 304 stainless steel, Monel R, and RTDs plated with copper and silver have been received and are being prepared for corrosion testing. Other RTDs are being coated with cadmium-titanium, nickel, nickel-P and Hinc.

Fixed Radiation Monitoring

E. H. Research Laboratories, Incorporated, and GE-APED log picoammeter prototypes were qualified per Purchase Specification HWS-5991, Revision 1. This completes the evaluation work for the fixed radiation monitoring program. A rough draft specification embodying information learned from the evaluation program, plus clarifications is 90% complete.

Design Test Services

The N-Reactor Program utilized 653 hours of engineering effort for design test service.

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PROJECT ENGINEERING

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

RLOO-AEC Directive HW-552 for \$14,000 for General Electric Management of Title II and III Design was received. A request for modification of the directive is currently being processed to RLOO-AEC to authorize \$16,000 for procurement of two hoists. A purchase requisition for these hoists has been completed.

CGI-105, Modifications for Use of Bauxite, KE and KW Water Plants

The approved design basis document was forwarded to the AEC on July 23, 1963.

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

Revision 4 to the project proposal requesting an extension of the directive completion date to August 31, 1964 has been approved by RLOO-AEC. Phase II Design remains at 45 per cent complete versus 100 per cent scheduled pending the receipt of added vendor information. A work order authorizing Vitro Engineering Company to proceed with the completion of the Design has been issued. The revised Certified Design Progress Schedule for this project has been approved by the AEC. This schedule indicates Design completion in April, 1964.

The revised construction schedule has been submitted to RLOO-AEC.

The seller of the safety circuit instrumentation has submitted a price change for an additional \$19,368 based on their interpretation of the purchase specification. This claim is being investigated.

Bids on the Neutron Detector System are being reviewed by Design Engineering.

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

The last major item of work, the new rear sample lines for the "A" sample room at 105-F, were installed and placed in service on July 16, 1963. The Physical Completion Notice, with exceptions, is dated July 17, 1963 and is being processed for submission to RLOO-AEC.

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

A review has been made of the effect of the interim planned operating procedures for the export system upon completion of the authorized project work in the 200 Areas. The planned procedure provides that the 200 Areas (282 E and W) reservoir control valve not be closed until the export system pressure has stabilized after an initial electric pumping failure. This change in procedure will permit manual closure of these valves and the automatic feature which was to have been provided for this project will not be required. Deletion of these features from the project scope have been approved by the Project Representative and the Design Council and forwarded to the AEC for approval.

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

A proposal for design and furnishing of equipment for subject work was received from Combustion Engineering, Inc. The proposal is not acceptable in that it does not meet our design criteria requirements, and it does not state what performance standards the new equipment will meet.

It is now apparent that the project cannot be completed by the presently authorized directive completion date.

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

Title II Design work for this project assigned to Vitro Engineering Company is currently estimated at 80 per cent complete against the scheduled 92 per cent. Also, Vitro had Design progress of 7 per cent since acceptance of the work July 1, but no drawings have been issued by them to date. 130 drawings and 5 purchase specifications have been issued for comment or approval. Of these, 115 drawings and 5 specifications have been approved. Additional alterations from the scope of the project includes the deletion of the truss deflection devices on the "C" platform and the retention in-line synchronization shafts and replacement of off-set shafts with in-line shafts of the same diameter which have been approved by the Project Representative and the Design Council.

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

RL00-AEC purchasing has changed the bid closure date from July 25 to August 8 for the static switching assemblies.

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

Permission has been received from RL00-AEC to negotiate the purchase of the system with Astrodata, Inc., on a CPFF basis.

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

The completion notice was forwarded to the AEC July 10, 1963.

CGI-976, Automatic Filter Backwash - 183-DR

Mechanical modification of the last filter control panel was completed July 25, 1963. Final electrical work is now underway.

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

Gages Installed	<u>This Period</u>	<u>To Date</u>
105-B	48	993
105-D	0	936
105-DR	183	1310
105-F	0	539

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The MJA has been revised to show completion by October 30, 1963, due to time required to procure gauges and the move of the vendor's repair facility from Richland to Skokie, Illinois.

AR-P-35011, Continuous Process Gas Chromatographs for 105-B, D, DR, F, and H, and Slave Recorders for 105-C, KE and KW

Final acceptance papers with no exceptions, have been forwarded to Manufacturing representatives for all areas but KE and KW. Installation of slave recorders in those areas still awaits move of some 107 gauges.

R-20520, K Retubing

We have received 3035 zirconium tubes from the Wolvering Tube Company, of which approximately 2,500 have been accepted from the vendor.

Quotations are being solicited by wire from prospective vendors for extruded aluminum front face nozzles to be used on the aluminum spline tubes.

All items for the August outage are on hand. It has been decided that there will be a one week gap between the outage at KW and at KE.

A design test is being circulated for approval which will permit a short key to be installed in the front gunbarrel. This will permit greater gunbarrel travel and greater tube life especially in those gunbarrels which are stuck. To install the shorter key it is necessary to remove the gas sleeve housing from the centering flange. The purpose of the test is to see how difficult it is to remove the sleeve without damaging threads.

Project Proposals Submitted to RLOO-AEC

CGI-108, Emergency Storage Basin Coolant
CGI-839, Rev. 4, Modification of Fuel Element Test Facilities, 1706-KEB

Directives Received

HW-485, Mod. 5, Modification of Fuel Element Test Facilities
HW-552, Fuel Element Charging and handling system - KW and KW Reactors
(Interim authorization for design in the amount of \$14,000)

CPFF Construction Service Contractor - Liaison

Issued 12 new work orders and supplemented six old jobs for a total of \$61,412 to J. A. Jones Construction Company.

Plant Forces Work Review

The Labor Standards Board approved one job for assignment to plant forces, estimated to cost \$4,250.

RT Jessen:dgm

Manager, Facilities Engineering

FINANCIAL

ACCOUNTING

The 100-H essential materials inventories were audited. With this audit, all reactor essential material locations have been covered during the past twelve months.

Overtime control levels for the first quarter of FY 1964 were established and approved by the General Manager.

Fiscal 1963 year-end closing activities were completed as scheduled. Accruals were prepared to cover all applicable FY 1963 costs which had not been received prior to cutoff dates.

The biannual physical inventory of IPD catalogued movable property and in-service spares is currently in progress and about 80 percent complete. Preliminary results indicate that property control and management procedures are being effectively administered.

AUDITING

Seven IPD and nine HAPO Organization and Policy Guides were revised and issued.

Manager-Finance

RW McMichael:AST:slb

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SIGNIFICANT REPORTS ISSUED

<u>Number</u>	<u>Class'n</u>	<u>Author</u>	<u>Date</u>	<u>Title</u>
HW-74094 VOL 1	Secret	Staff of Process Develop- ment Subsection	6-21-63	Safety Analyses and Hazards Evaluation Six Oldest Hanford Production Reactors
HW-74095 VOL 1	Secret	Staff of Process Develop- ment Subsection	6-28-63	Safety Analyses and Hazards Evaluation K Production Reactors
HW-77933	Secret	DH Frieling GE Wade	6-21-63	Technical Analysis of the Frozen Gunbarrels - K Reactors
HW-78045	Unclass.	DE Cooley	6-26-63	Design Test 1178 - Evaluation of Universal Flexible VSR Accessory Equipment, 105-K and C Reactors
HW-78151	Unclass.	JW Ballowe	7-9-63	Preliminary Engineering Program Coolant Backup, Six Old Reactors
HW-76476 Rev. 1	Unclass.	GE Peck	7-12-63	Design Criteria for Evaluation of Off-Site Shipping Casks in Current Use by IPD
HW-77338	Secret	GE Peck	7-12-63	Evaluation of the B Cask in Accordance with Proposed Regu- lations of the AEC & ICC for Off-Site Shipments of Irra- diated Bismuth
HW-77769	Secret	GE Peck	7-12-63	Evaluation of the "Machined Parts" Cask for Off-Site Shipments of Irradiated Lithium
HW-77771	Unclass.	GE Peck	6-20-63	Evaluation of HAPO-13 & 14 Casks for Off-Site Shipment of Radioactive Isotopes
HW-77803	Secret	EL Etheridge	6-10-63	Design Bases - Bauxite-Sulfuric Acid Feed Facilities - 100-K Area
HW-78058	Conf. Undoc.	LB Brinkman	6-28-63	Design Criteria for Emergency Storage Basin Coolant

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<u>Number</u>	<u>Class'n</u>	<u>Author</u>	<u>Date</u>	<u>Title</u>
HW-78078	Unclass.	LB Brinkman	7-1-63	Project Representatives Meeting #1, Project CGI-108, Emergency Storage Basin Coclant
HW-78082	Unclass.	CC Steele	7-1-63	CGI-960 "C" & "D" Work Platform Safety Improvements, All Reactors, Review of Third Party Recommendations for Correction of Hazards
HW-78117	Unclass.	EL Etheridge	7-5-63	Bauxite-Sulfuric Acid Feed Facilities, 100-K Area - Project Representatives Meeting No. 1
HW-77788	Unclass.	FE Haun, Jr.	5-16-63	Design Test 1132, NPR - Vibratory Fatigue of Primary Pipe Specimens Final Report
HW-77073	Unclass.	WEB Lander	5-17-63	K Reactor Spline Seal Insert Modification Evaluation Test Report
HW-78026	Unclass.	JM Goff, Jr.	6-25-63	Report of Design Test 1164 - Shear Strength of Aluminum Tube Van Stone Flanges - K Retubing Program
HW-78027	Unclass.	JM Goff, Jr.	6-25-63	Report of Design Test 1165 - Fatigue Life of Aluminum Van Stone Flange - 100-K Retubing Program
HW-78028	Unclass.	JM Goff, Jr.	6-25-63	Report of Design Test 1166 - Nozzle Wear Resistance to Charging Unsupported Fuel Elements, 100-K Retubing Program
HW-78081	Unclass.	WEB Lander	7-1-63	Design Test 1161 - Evaluation of Stainless-to-Stainless Bearings in N Reactor Underwater Fuel Handling Conveyor
HW-76933	Unclass.	JM Goff, Jr.	7-2-63	Design Test 1112, Interim Test Results, NPR Production Horizontal Rod and Drive Assembly

Number	Class'n	Author	Date	Title
HW-77894	Unclass.	JL Rusk	7-11-63	Design Test 1163, Gunbarrel Retaining Groove Yield with Inconel-X Retaining Rings, 100-K Retubing Program
HW-77998	Unclass.	KG Hawkins	7-17-63	Design Test 1170 - Report 105-C and 105-K Ball 3X Bellows Elongation Test
--	Unclass.	JM Goff, Jr.	7-11-63	Report of Design Test 1169, Change in Viscosity of Silicone Foam with Temperature
--	Unclass.	JM Goff, Jr	7-12-63	Report of Design Test 1176, B-D-F Aluminum Van Stone Pull Test
--	Unclass.	WEB Lander	7-18-63	Final Report of Design Test 1179 - Meaning of 'x' Orientation of KV Fuel - 105-K
HW-76653	Unclass.	PN Watson	7-17-63	Interim Report, Raw and Filtered Water Piping Survey
HW-76811	Unclass.	TM Clement	3-1-63	Process Tube Effluent Temperature Monitor System, Acceptance Limits of Error and Methods for Complying with Established Limits, B, C, D, DR, F and H Reactors
HW-77956	Unclass.	HC Brockman	7-10-63	Development Test DT-IP-594-F, Ball 3X Lockbars & Reset Levers - 105-C
HW-77973	Unclass.	RD Duncan	6-20-63	Capabilities of the Rotary Rock Drill for Cutting Irradiated Nuclear Grade Graphite in a Hanford Production Reactor
HW-78039	Conf.	TW Hauff HF Jensen RH Smith	6-27-63	Chemical Decontamination of Hanford Production Reactors
HW-78169	Unclass.	ML Faught	7-2-63	Nuclear Safety Review Equipment Hazards Study Group, K Reactor Sub-Section, Parts I and II
HW-78170	Secret	JR Young	7-10-63	Tube Wall Thickness, Isotope Production Tubes

Number	Class'n	Author	Date	Title
HW-78253	Secret	JR Young	7-12-63	Final Report, The Reactor Process Tube Problem, July, 1963
HW-78257	Official Use Only	TW Hauff	7-19-63	Reactor Scram Experience - 1960-1963
HW-78276	Unclass.	EJ O'Black	7-17-63	Major Electrical Problem Status and Electrical Plans, Manufacturing Section
HWS-7349 and Rev. 1	Unclass.	RD Duncan	6-14-63 7-5-63	Specification for Silicone Rubber Gas Seals
HWS-7362	Unclass.	RM ImPerre	7-25-63	Specification for Nozzle Adaptor O-Ring Seal - All Reactors
HWS-78022	Unclass.	WD Hamilton	7-5-63	Solid State ZTM Controller Installation - 105-DR Development Test No. IP-595-S
HW-78374 RD	Secret	IL Huffman	7-24-63	Low Flow Tubes
HW-78345	Unclass.	GB Hansen	7-22-63	Uranium Quality Control Analytical Results
HW-78083	Unclass.	VP Thomas	7-1-63	Tester Audit Plan for Task Force Evaluation
HW-78056	Conf. Undoc.	GL Hammons FW Knight	6-28-63	Specifications for Depleted Ingot Uranium Fuel Cores
HW-77145	Unclass.	CK Michaelis TD Gibbs	7-11-63	Reliability and Future Expansion of 300 Area Utilities
HW-77974	Unclass.	LF Reilly	7-20-63	Design Criteria for Utilities Extension 300 Area
HW-78280	Unclass.	LF Reilly	7-19-63	Design Criteria - Boiler Replacement for Additional Steam Generating Capacity - 384 Building, 300 Area Project CAI-107
HW-76233	Secret	WN Mobley	7-16-63	Production Forecast
HW-78317 RD	Secret	HF Tew	7-22-63	Production Assumptions and Schedules

Number	Class'n	Author	Date	Title
HW-78369 RD	Secret	WN Mobley	7-24-63	Production Assumptions and Schedules
HW-78346 RD	Secret	WN Mobley	7-24-63	Whiskin Delivery Schedule

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HW-78451

TRIPS

<u>Name</u>	<u>Firm & Location</u>	<u>Date</u>	<u>Purpose</u>
FW Van Wormer	Atlantic City, N.J.	6/23-26/63	Attend meeting of American Society for Testing and Materials.
SS Jones	Washington State University Albrook Hydraulic Lab. Pullman, Wash.	7/8/63	Consult on export system.
CG Lewis	Atomic Power Equip. Dept. San Jose, Calif.	7/11-12/63	Discuss irradiation testing techniques and operation.
	Vallecitos Atomic Lab. Pleasanton, Calif.		" " "
MH Schack	ASME Convention	6/10-11/63	Official delegate for Region IX.
BW Herrman	Univ. of Calif. Los Angeles, Calif.	8/14-19/63	Attend short course "Systems Approach to Reliability".
	General Electric Co. Space Power & Propulsion Section Cincinnati, Ohio	8/20-23/63	Interview at their request.
VG Blanchette	Mississippi Test Support Operation GE Company Huntsville, Ala.	7/26/63	Employment interview at their request.
CA Munro	International Design Corp., Tacoma, Wash.	7/15-16/63	To discuss DDR-172 Contract.
	Marine Iron Works Tacoma, Wash.	Same	Same.
	Heath Manufacturing Co. Kent, Wash.	Same	Same.
	Pacific Steel Products Seattle, Wash.	Same	To discuss DDR-161 Contract.

Name	Firm & Location	Date	Purpose
PB McCarthy	Union Machine Works Seattle, Wash.	7/23/63	To discuss SSFE charging machines and magazines for SSFE charging machines.
	Pacific Steel Products Seattle, Wash.	Same	Same.
	Dow Metal Seattle, Wash.	Same	Same.
FJ Mollerus	Bonneville Power Administration Portland, Oreg.	6/27-28/63	Discussion of alternate HAPD power source (4th lines).
RT Jaske	Coulee Dam and surrounding points Coulee Dam, Wash.	7/25-26/63	Measure water temperatures in support of river cooling program.
Anna R. Lewis	Denver, Colorado	7/15-19/63	Attend National Secretaries Association (International), Eighteenth Annual Convention.
HW Acker	Thermowell Inc., Paramount, Calif.	7/19/63	To resolve problems on the H Area thermowells.
CR Oak	Pacific Steel Co. Seattle, Wash.	7/27/63	To inspect tube probe fabrication.
LL Samford	ALCOA Seattle, Wash.	7/18/63	Discuss aluminum caps and cans.
LL Samford	Conrad Corp. Tacoma, Wash.	7/19/63	Discuss steel sleeves.
LL Samford	D.C.I. Co. Seattle, Wash.	7/19/63	Discuss steel sleeves.
LL Samford	Rottler Boreing Bar Seattle, Wash.	7/19/63	Discuss steel sleeves.
ES Bell	Leo A. Daly Seattle, Wash.	7/30/63	Consultation Architect-Engineer on Project CAF-961.
EA Weakley	National Lead Co. Fernald, Ohio	7/1-3/63	Discuss uranium quality control problems.
H Leigh	General Aluminum Corp. Spokane, Wash.	7/22/63	Discuss feasibility of casting an autoclave basket.

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HW-78451

VISITORS

<u>Name</u>	<u>Firm & Location</u>	<u>Date</u>	<u>Purpose</u>
Dr. Garth Wilson	E.H. Research Labs. Oakland, Calif.	6/19-20/63	To make modifications in their log picoammeter prototypes.
RW Hyde	Arthur D. Little Co. Cambridge, Mass.	7/9-11/63	Consult on Contract CA-379.
CF Tonjes	Cryenco, Inc. Denver, Colorado	7/11/63	Consult on helium purification and supply.
T Ward	Combustion Engi- neering Chattanooga, Tenn.	7/18/63	NPR metallurgy of heat exchanger tubing.
P DeRienzo	Burns & Roe Hemstead, L.I., N.Y.	Same	Same.
T Stephens	Kaiser Engineers Oakland, Calif.	Same	Same.
MM Cawdrey	National Lead Co. Fernald, Ohio	7/25/63	Uranium deliveries.
R Wilkins	Conrad Corp. Tacoma, Wash.	7/2/63	Steel sleeve problems.
J Ransom	Weatherhead Corp. Seattle, Wash.	7/3/63	Discuss aluminum cap and cans.
D Guy	ALCOA Seattle, Wash.	7/16/63	Discuss aluminum caps and cans delivery.
J Horton	Travelers Indemnity Co. Seattle, Wash.	7/12/63	Inspection of pressure vessels.
BJ Christensen SA Clark SF Short RC Small	Leo A. Daly Seattle, Wash.	7/17/63	Tour site for architectural work to be done.
M Thompson	Bridgeport Brass Bridgeport, Conn.	7/25/63	Discuss aluminum caps and cans.
JW Driver	Bridgeport Brass Portland, Oregon	7/25/63	Discuss aluminum caps and cans.

U-8

Name	Firm & Location	Date	Purpose
CP Allen R Rees	Star Machinery Co. Seattle, Wash.	7/11/63	Inspect equipment of their Company installed in 105 storage area.
J Morris	Precision Engi- neering Seattle, Washington	7/22/63	To discuss Vacu-Blast tooling.
HA Chamblus	Vacu-Blast Corp. Belmont, Calif.	7/22/63	To discuss Vacu-Blast tooling.
W Cottingham	Yost Industry Sales Seattle, Wash.	7/15/63	To discuss a jet steam cycle for storage basin cleaning.
RL Taylor	Corning Glass Works Seattle, Wash.	7/23/63	Discuss a reaction system for the bauxite process.

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