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MONTHLY RECORD REPORT

IRRADIATION PROCESSING DEPARTMENT

JULY, 1957

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IRRADIATION PROCESSING DEPARTMENT
SUMMARY
MONTHLY RECORD REPORT
JULY, 1957

RESEARCH AND ENGINEERING OPERATION

The testing of I & E Fuel Elements continued at C Reactor with no failures reported to date. Normal uranium I & E slugs are operating at an average of 820 MWD/T and maximum specific powers approaching 60 KW/ft. Three tubes of enriched uranium I & E slugs reached exposures of about 1550 MWD/T at specific powers approaching 90 KW/ft. Initial charges in KE Reactor also operated without incident and at month's end "old pile" size I & E slugs were charged into D Reactor.

Data obtained on eight charges of M-388 jacketed elements indicate that corrosion characteristics of this alloy will be as acceptable as those of the 1245 alloy.

Testing of 1/2" inside diameter cored 1245 alloy jacketed fuel elements at KE Reactor was discontinued. Data revealed that the failure rate of these elements is significantly higher than for solid elements at comparable heat generation rates.

Steps have been taken to reduce process tube bowing in B & F Reactors by increasing graphite temperatures in the area of maximum curvature.

The increase in shield temperatures at H and B Reactors necessitated issuance of instructions for loading poison which is used for control.

PRODUCTION AND REACTOR OPERATIONS

Input production (Pu) for July was 99.3 percent of forecast and output production was 123.5 percent of forecast. Output forecast was exceeded due largely to discharges during unscheduled outages late in the month.

The maximum established power level (combined maximum levels for all reactors during any one day) was increased 944 megawatts above the previous high established during January, 1957. Maximum levels at individual reactors were increased 135 megawatts at KW, 65 at F, 30 at D, 25 at H and 5 at DR. The increase at KW was due to higher tube power limits resulting from increased water flow; the increases at other reactors resulted largely from increased cooling water following the installation of Project CG-558 facilities.

Sixty-two reactor outages, of which 35 were scrams, resulted in an overall time operated efficiency of 74.5 percent, including a ten-day Project CG-651 outage at C Reactor. Forecast was 78 percent.

Twelve ruptures, nine regular metal and three production test, were removed from the reactors during July. Four of the regular metal ruptures were at DR, two each at C and KE and one at B. Two production test ruptures (solid E) were at C and one (Ni-Al alloy can) was at D. None of the ruptures could be removed by the "quickie" method.

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Process tubes were replaced at B, D and H Reactors during the month. Twenty-nine were installed at B, 7 at D and 60 at H.

Significant items of equipment experience were: (1) C Reactor was shut down ten days starting July 7 for Project CG-651 "Continuous Charge-Discharge - Demonstration Unit." (2) Two junctions in the DR Reactor far-side effluent line were found to be improperly welded together. The resulting water leakage from this location is believed to have been the primary cause of DR ground settling. (3) Seven process tube water leaks were located and corrected during July. Three of these leaks were caused by ruptures at DR, one was a tube leak at F and three were Van Stone leaks (one each at C, D and F). (4) Continuous six-pump coolant water flow was begun at KW Reactor and flow was increased to 165,000 GPM. (5) 3X system balls were dropped from 49 hoppers at KW when a soft-solder fitting in the C Riser sensing line failed. (6) Graphite distortion in the top, far corner of F Reactor necessitated the charging of nine tubes with altered charges. During July all tubes charged at F below row 36 were charged in accordance with PT-IP-981 "Revised Tube Charge Pattern for Graphite Annealing."

There were no disabling injuries or security violations during July. One technical radiation over-exposure occurred.

Statistics for the Processing, Power and Radiation Monitoring Operations in the individual reactor areas are tabulated on pages Ch-1 through Ch-6 of this report.

FACILITIES ENGINEERING OPERATION

Process Design

The final report on the results of power recovery studies performed for existing reactors during the past year has been issued. The report of a separate study regarding conversion of an existing reactor to organic cooling with subsequent power recovery is being prepared.

Design bases for a pressurized water-cooled Improved Production Reactor concept are being reviewed and brought up-to-date.

Equipment Development Operation

The contract for scope design and fabrication of a prototype rear-face manipulator has been approved and sent to General Mills Inc., for their approval.

During the month a prototype vertical safety rod system was tested for Project CG-708. Insertion of the rod by air pressure was accomplished in 0.7 of a second, compared to 1.8 seconds for gravity fall.

Plant and Industrial Engineering Operation

A total of 95 suggestions were received and evaluations were completed on 141 suggestions. At month end the backlog had been reduced to 297 suggestions awaiting evaluation.

Present backlog of new drafting work is approximately 3,000 manhours. The off-plant contract for draftsmen is presently inactive and efforts to borrow draftsmen from other Departments have not been successful.

Effluent disposal problems continued to occupy a major portion of available engineering time. Engineering efforts included a re-evaluation of the extent of

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100-K Area basin repairs, additional liaison at 105-DR Building during effluent leak repairs, and additional scoping of repairs to the floors of one of the 107-C basins.

Project Engineering Operation

The DeLaval Steam Turbine Company's letter of May 24, in which corrosive water was claimed to have been the cause of 183 Building pump cavitation, has been answered and information given to refute this allegation.

During an outage which started July 8, 1957, the installation for the CG-651 Project, "Continuous Charge-Discharge Equipment, C Pile Demonstration Unit", was completed. Five tubes were satisfactorily flush discharged at the end of the outage to test the operation of the installed equipment.

After approximately 60 days of operation, the No. 12 Byron-Jackson pump in 190-C was opened during the week of July 29, with Byron-Jackson engineers present to examine the cavitation results. The consensus is that the extensive cavitation erosion would reduce the life of the impeller to less than one year.

Principal Engineers

Assistance was given the HAPO General Manager, W. E. Johnson, in the preparation of his testimony before the Legislative Subcommittee of the Joint Committee on Atomic Energy on June 24, 1957. Two reports were prepared and issued, and additional studies on unit costs for new type reactors were undertaken.

A central VSR in 100-KW was so badly bent that it had to be removed by a winch. Examination indicates that the failure was mechanical rather than thermal.

Engineering Auxiliaries Operation

Nine jobs were approved by HOO-AEC Labor Standards Board for assignment to Plant Forces. This includes six FY-1958 budgeted maintenance jobs.

Project Maintenance Operation

The installation of the Gamma Monitoring System at 105-KE and KW was completed except for instrumentation.

EMPLOYEE RELATIONS OPERATION

Priority attention continued to be given to the placement of exempt people in Facilities Engineering who are on the availability list. Ten employees remain to be placed. Ph.D. recruitment activity showed signs of decreasing; although fewer interviews were held, more offers were processed. Thirty-one additions to the Department's payroll were made and 26 employees were removed from the roll. Placement of nonexempt people facing removal from roll for lack of work has been very good. Including two craft employees who turned down offers for other work, a 90% success factor has been achieved in placing these people elsewhere in the Department or in other HAPO departments.

In addition to the normal mass communication activities, two new communication devices were initiated during the month. The first issue of "Round Table Guide" was distributed to approximately 100 first-line supervisors who had requested it. Two issues of a "Memo from the General Manager," signed by A. B. Greninger, were offered to all employees through the five 100 Areas' main badge houses.

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The Bureau of Labor Statistics Cost-of-Living Index for June 15 reached a new high of 120.2. On the basis of our cost-of-living formula, nonexempt employees will be entitled to a 1.77% increase in base rates to be effective July 29. On July 5, 1957 the Company submitted its brief to the National Labor Relations Board for the 1706-KE-KEE joint petition case. During the month, the Hanford Atomic Metal Trades Council notified the Company of their desire to arbitrate two IPD grievances: one concerns the practice of contacting people at home or at the bus lot to inform them of a change in area assignment for their next shift and the other concerns the use of a qualified Utility Operator to replace an absent Pile Operator.

The Functional Organization Charts and the Organization Directory for IPD were revised and published during the month. Considerable effort was directed toward adjustments in the Maintenance Operations for the purpose of improving decentralized planning and supervision of outage work, better definition of exempt Maintenance positions, and possible reallocation of supervisory responsibility resulting in some positions supporting a higher level which would provide an improved salary differential. The consolidation of exempt salary records with those maintained by Monthly Payroll is scheduled for August 1, 1957.

There were eight fire alarm responses in July with damage estimated at \$15. Seven employees of 100-D were given a demonstration in artificial respiration. The Chief - Fire Protection attended two meetings with Civil Defense authorities in regard to planning the alert on July 12, 1957, made a preliminary inspection of a tank truck under construction in Portland, and attended the Annual Conference of the Pacific Coast Inter-Mountain Association of Fire Chief's on July 16-19.

Statistics indicate that another successful accident prevention month has been recorded. Barring a disabling injury during the interim, the President's Award will be attained on August 13, 1957. Preparations have been made for selection and distribution of gifts.

FINANCIAL OPERATION

A detailed analysis of IPD Maintenance overhead expenses was prepared for use as a basis for establishing revised standard IME rates. Revised rates were placed into effect July 29, 1957 for each of the six Reactor Maintenance Operations.

A new monthly Power Cost Report has been devised. The report, in flow chart form, will show the flow of water, steam, total cost and unit cost from the river pump house to the reactor.

A weekly FEO cost distribution report is now being issued and appears to satisfy the needs of FEO personnel. No additional cost personnel were required to provide this improved service.

Nonexempt employees received an additional 1.77% cost of living increase effective July 29, 1957.

The special task force, which included an IPD auditor, has completed compilation of information for the Davis-Bacon Report.

The various sub-pools of 100-H Area Motor Pool were combined on July 1 into a

general pool at the 1716-H Building, under the supervision of Transportation and Maintenance Operation (R & U).

The first of three paperwork improvement clinics was held under the direction of Professor William Engesser. All exempt personnel of Financial Operation attended this clinic, together with selected personnel from other departments and operations.

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IRRADIATION PROCESSING DEPARTMENT
MONTHLY REPORT OF INVENTIONS OR DISCOVERIES

JULY, 1957

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

Name

Title

W. E. Cawley

Method of Constructing Pressure
Vessels for Extremely High Pressures

General Manager
IRRADIATION PROCESSING DEPARTMENT

AB Greninger:mfa

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RESEARCH & ENGINEERING OPERATION

JULY 1957

VISITORS AND BUSINESS TRIPS

O. H. Greager, R. L. Dickeman, G. C. Fullmer, J. H. Brown and R. E. Trumble attended a meeting of the Hazards Evaluation group of the AEC in Washington, D.C. to discuss reactor safeguards, July 26-31. O. H. Greager and R. L. Dickeman subsequently visited the Argonne National Laboratories and GE offices in New York to discuss technical problems and personnel, respectively, August 1 - 3, 1957.

A. G. Blasewitz attended meetings to discuss the proposed 100-DR Recirculating Gas Loop with the AEC in Washington, D.C. and Battelle Memorial Institute in Columbus, Ohio, July 10 - 12, 1957.

R. E. Baars visited GEL in Schenectady, N. Y. to discuss problems associated with the 100-DR Recirculating Loop on July 8, 1957, but was unable to attend subsequent meetings in Washington and Columbus because of illness.

W. J. Van Den Berg, Jr. visited GE in Schenectady for transfer interviews July 7 - 12, 1957.

ORGANIZATION AND PERSONNEL

	<u>Permanent</u>		<u>*Rotational</u>	
	<u>June</u>	<u>July</u>	<u>June</u>	<u>July</u>
Management and Administration	4	4	-	-
Process and Reactor Development Operation	28	30	7	6
Process Technology Operation	37	37	4	6
Operational Physics Operation	19	19	8	9
Irradiation Testing Operation	22	21	5	4
Coolant Testing Operation	24	24	3	4
Component Testing Operation	23	23	3	3
	<u>157</u>	<u>158</u>	<u>30</u>	<u>32</u>

* Includes summer program personnel

Process and Reactor Development: J. A. Roberson, previously considered "rotational" since he is assigned for the summer period only, is a Senior Engineer and classified as "permanent" for purposes of cost accounting. J. C. Peden, Engineer II, was transferred from Relations and Utilities Operation effective July 1, 1957.

Process Technology Operation: P. M. Richardson, Graphic Illustrator, was transferred from Relations and Utilities Operation effective July 22, 1957. H. L. Floyd, Engineer Assistant, was transferred to Hanford Laboratories Operation effective July 29, 1957.

Irradiation Testing Operation: P. M. Jackson, Engineer II, was transferred to Hanford Laboratories Operation effective July 1, 1957.

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B-1

PROCESS AND REACTOR DEVELOPMENT

Reactor Fuels

I & E Slugs

Charging of I & E fuel elements into C-Reactor continued with about 75 new charges loaded this month. About 565 tubes have been charged to date of which 397 are continuing their irradiation at month's end. Despite average exposures of tubes discharged at 820 MWD/T and maximum specific powers approaching 60 KW/ft there have been no I & E failures.

Three charges of enriched (1.44% U-235) I & E slugs continue to operate at specific powers approaching 90 KW/ft without incident. Exposure of these charges approximates 1550 MWD/T. Solid slug control charges at equal enrichment have now failed at exposures of 1050 and 1225 MWD/T.

The initial charges of I & E slugs loaded in KE-Pile have operated without incident and initial loading of "old pile" size I & E slugs in D-Pile were charged at month's end.

M-388 Alloy

Data have now been obtained on eight charges of M-388 jacketed elements. A hot-spot failure of an M-388 clad element occurred at D-Reactor and one is suspected, but not yet confirmed, at K-Reactor with exposures of 295 and 600 MWD/T, respectively. Radiometallurgical examinations of the D-Reactor are now in progress to determine what type corrosion mechanism is responsible for the failure. Corrosion data from the eight charges show that in a given charge the maximum rates experienced by M-388 and 1245 cladding are comparable. As a practical matter it appears that the uniform corrosion characteristics of M-388 will be as acceptable as those of the 1245 alloy.

Category II Fuel Tests

Three 1.8" diameter cored fuel elements which were irradiated in the KE front-to-rear test hole have been discharged and the fuel charges are awaiting post-irradiation examination. These are performed under production test IP-51-A. Seven-rod cluster elements also irradiated in the KE front-to-rear test hole have reached their goal exposure of 1000 MWD/T.

The current status of reactor fuel element development production tests is shown in Table I.

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TABLE I

ACTIVE PRODUCTION TESTS - FUEL DEVELOPMENT

<u>Test Number</u>	<u>Type Metal</u>	<u>No. of Tubes</u>	<u>Reactor</u>	<u>Goal Exposure</u>	<u>Current Exposure</u>	<u>Remarks</u>
105-586-A	U-Si Ingots	1	B	900		Discharged at 1007 MWD/T.
	U-Si Ingots	4		2 ruptures		Not yet charged.
	U-Si Cored	3	900	900		Not yet charged.
	Control	4		2 ruptures		Not yet charged.
105-590-A	Extruded Cored	4	C	2 ruptures		Not yet charged - compares performance of extruded and drilled cored slugs.
105-597-A	Mg-U-Matrix	1	B or D	3000		Not yet loaded. Two enriched matrix slugs, 31 regular slugs.
		1	B or D	6000		Not yet loaded. Ten matrix enriched and 12 natural matrix slugs.
105-620-A-65MT Tru-Line Supplement B		676	C	Normal goal		Provides for quantity charging of Tru-line slugs.
105-631-A	Thin Caps & Can Bases	3	C	100-250	about 230	One test and one control charge discharged at 120 MWD/T
		3 control	C	100-250	about 230	
105-636-A-58MT C-Metal		20	C	Normal Burnout	Loaded 9-23-56	Ten charges each of double-length and Tru-lined "C" slugs will be irradiated to normal burnout. Inspection on discharge will determine degree of protection from "chattering."

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TABLE I (Continued)

<u>Test Number</u>	<u>Type Metal</u>	<u>No. of Tubes</u>	<u>Reactor</u>	<u>Goal Exposure</u>	<u>Current Exposure</u>	<u>Remarks</u>
DT-105-623-A	Regular		DR	Normal goal		Provides for hand seating of charges loaded on alternate outages. Investigates effect upon failure rate.
IP-1-A	1.44% U-235 I & E Lead Dip	4	C	2 ruptures	About 1495	Tests I & E slugs at conditions comparable to 100° bulk effluent limit operation. Ruptures have occurred in two solid enriched control charges. Exposures at failure were about 1050 and 1225 MWD/T.
IP-4-A	Cored	678	KE			Authorizes irradiation of production quantities of cored slugs.
IP-19-A	Lead Dip Canned I & E	75	H			Provides for the pilot charging of I & E slugs at C-Reactor.
IP-30-A	1.44% U-235 3/8" cored	395	C	800 variable	50-750	Three failures occurred in 5/8" cored enriched charges at 132, 135, and 195 MWD/T. All other enriched charges discharged because of excessive emission of radioactive gas associated with failures in this material.
	1.44% U-235 1/2" cored	4	C	2 ruptures		
	1.44% U-235 5/8" cored	4	C	2 ruptures		
	1.44% U-235 Solid	4	C	2 ruptures		
	Solid	12	C	400, 600, 800		All 12 tubes discharged at goal exposure. Irradiation complete.
	3/8" cored					
	1/2" cored					
	5/8" cored					

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TABLE I (Continued)

Test Number	Type Metal	No. of Tubes	Reactor	Goal Exposure	Current Exposure	Remarks
IP-43-A	Lead Dip Canned M-388 (1% Ni) alloy	8	KE	400,500,600	All tubes dis- charged at goal	Compares uniform corrosion resistance of M-388 and 1245 alloy jackets. Each reactor also receives about 20 lot charges of M-388 jacketed slugs. Rupture occurred in M-388 piece at 295 MWD/T in D-Reactor. Rupture occurred in regular control piece at 607 MWD/T in KE Reactor.
		22	KE	Normal		
		12	C	400,500,600	420-510	
		20	C	Normal		
		17	C	Normal (cored)		
		8	D	400,500,600	About 410	
IP-44-A	Lead Dip Canned M-388 (1% Ni) Alloy Jackets	10	B	300,400,500	About 385	
		22		Normal		
		20		Normal (cored)		
IP-44-A	Vacuum Canned I & E Slugs	4	C	400,600,800	About 90	
IP-45-A	Hot Press Canned I & E Slugs	4	C	400,600,800	About 90	
IP-46-A	7-rod Clusters	1	KE	1000		Two 7-rod cluster fuel elements. Irradiation conducted in front- to-rear test holes. Discharged at goal exposure. Irradiation complete.

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TABLE I (Continued)

Test Number	Type Metal	No. of Tubes	Reactor	Goal Exposure	Current Exposure	Remarks
IP-56-A	Ingot U	17	DR	300,500,700	200-680	Uranium cores are low hydrogen content ingot U. Four tubes discharged at goal exposure.
		171	DR	Normal		
IP-58-A	Alpha Extruded Uranium	16	F	300,500,700	About 60	
IP-70-A	Lead Dip Canned I & E	2	KW	500	365-440	One charge each, C I & E and K I & E
IP-95-A	Lead Dip Canned I & E	4	D	400,600,800		Loaded 7-30-57
	Lead Dip Canned I & E	4	D	2 ruptures		Not yet charged.
	Regular Control Solid	4	D	400,600,800		Loaded 7-30-57
	Regular Control Solid	4	D	2 ruptures		Not yet charged

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DECLASSIFIEDReactor PhysicsKER Physics

Calculations have been made of the power generation to be expected in a KER tube relative to that in an adjacent normal column which agree very well with the experimental results. Lattice parameters have been calculated for several of the slugs to be used in KER loops, as a guide to establishing irradiation conditions for the proposed tests.

Reactor Safety

Analysis of the boilout experiments is complete and a report is being prepared. The results were used in analog calculations to determine the maximum metal temperature rise during a water loss excursion. The analog results in turn have been used to determine the maximum permissible reactivity jump at various power levels if the "no melting" criterion is to be met at all times. It appears that even in C-Pile at post CG-600 conditions using I & E slugs, the criterion could be met with a relatively small production loss. The results of all of these calculations and experiments were presented in Washington on July 30 to the Reactor Hazards Evaluation staff and Division of Production personnel.

Reactor EngineeringBulk Outlet Temperature Limits

In the continuing study of the bulk outlet temperature limit problem a simplified analysis was made of the effects of a bulk effluent temperature above the downcomer saturation temperature. It may be concluded from this analysis that unstable flow conditions will not be caused from a BPA outage, 15% power surges, and certain other possible events in bulk temperature operation at 90-95°C. The results are not adequate to determine, however, whether effluent system damage will occur under these conditions.

Essential Materials

The Klickitat plant of the Gas Ice Corporation was visited on July 2 to determine the source of difficulties which resulted in poor quality below specification carbon dioxide gas. Shipments were received following changes in the method of shipment. Difficulties encountered appear to have been resolved since shipments received after institution of appropriate recycling and modified loading techniques have been satisfactory.

Reactor PlanningAdvanced Engineering - Organic IPR Evaluations

The majority of both engineering and physics IBM program computations have now been received.

To date only the solid slug cases have been analyzed in detail. As reported earlier, the choice of values of Graphite-Uranium volume ratio should have

DECLASSIFIEDAdvanced Engineering (Continued)

included a nominal value of 15 between the values of 10 and 20 already computed, for the cost varies most rapidly in this region. It further develops that the choice of neutron temperature for these cases was a poor one - this parameter should actually be a dependent variable. Reductions in the incremental cost are computed when more reasonable values - based on expected volume average graphite temperatures - are used. This results from the rapid variation of Pu-239 cross-section with neutron temperature, lower temperatures resulting in a lower rate of destruction of previously formed product and permitting higher yields and higher optimum fuel exposures.

Without waiting for additional data points a demonstration solid slug case has been selected, based on the analysis of data in hand, for re-computation and intensive analysis. Based on the costs developed to date, it is predicted that the demonstration case will meet the IPR ground rules. It cannot be said that it will represent the "best" possible case - even within the ground rules used for the study; for there are indications that improvement can yet be made by reduction of the lattice size below the 6" x 6" minimum used in this study. Program input data for the demonstration case have been submitted for computation.

Project Liaison

Project representatives met and approved design criteria for Project 707 - the sub-critical monitor. Justification for K water plant expansion was reviewed and clarified in a meeting with FEO personnel preliminary to preparation of a project proposal.

Revision 1 to the project proposal for installation of three organic test loops was reviewed and commented upon. An interim proposal, asking \$35,000 for pre-scope work on this project has been submitted to the Commission but no directive has yet been received.

Radiological EngineeringRadiation Control Experience

Sixteen Reports of Lapse of Radiation Control were issued during the month. Fourteen of these were within the responsibility of the Irradiation Processing Department.

Seven of the Lapses of Control experienced during July were caused by the spread of contamination to the skin and personal clothing of employees. This is nearly double the number of this type of Lapses of Control experienced in June. Five of these Lapses of Control were due to personal clothing contamination, and two were cases of high level skin contamination.

There were three cases during July where employees received uncontrolled exposure to radiation of such a magnitude as to be judged Lapses of Radiation Control. In four instances during the month contamination was spread outside Radiation Zones or dose rates existed outside Radiation Zones of such levels as to be judged Lapses of Radiation Control.

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Of the two Lapses of Control which were not the responsibility of the Irradiation Processing Department, one involved a case of shoe contamination of an employee of the CPD air balance group which was working in 100-H area. The other involved the spread of contamination during removal and disposal of horizontal control rods at 105-C. The work was being done by Minor Construction and monitoring was being performed by the Hanford Laboratories monitoring group.

LAPSE OF RADIATION CONTROL
DISTRIBUTION BY REACTOR AND OPERATION

	<u>B</u>	<u>C</u>	<u>D</u>	<u>DR</u>	<u>F</u>	<u>H</u>	<u>KE</u>	<u>KW</u>	IPD Totals
Processing	1	0	2	1	1	0	0	1	
Maintenance	0	0	0	2	1	4	0	0	
Supplemental Crews	0	0	0	0	0	0	0	0	
Radiation Monitoring	0	0	0	0	0	0	0	0	
Research & Engineering	0	0	0	0	0	0	1	0	
Central Maintenance	0	0	0	0	0	0	0	0	
Reactor Operation	0	0	0	0	0	0	0	0	
Assigned totals	<u>1</u>	<u>0</u>	<u>2</u>	<u>3</u>	<u>2*</u>	<u>4</u>	<u>1</u>	<u>1</u>	<u>14</u>
IPD Unassigned									0

* In the case of F-Reactor, the Lapse of Control was chargeable to two components.

Effluent Water Statistics

Through the cooperation of the Radiation Protection Operation, HLO, the following data is reported. Measurement of the concentration of particular radioisotopes in the river water at 100-F and at Pasco was recently begun, therefore past data is not available. Previously this information was obtained by extrapolation from reactor effluent activity output data.

Activity in River Water at Pasco

June	0.23% MPC _{GI}	4.6% off-plant limits
July**	< 0.64% MPC _{GI}	< 12.8% off-plant limits

Activity in River Water at 100-F

July**	< 1.31% MPC _{GI}	< 13.1% plant limits
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Off-plant limits are 1/20 of the MPC values and exposure to plant personnel should be less than 1/10 of the MPC values

* MPC_{GI} - Maximum permissible concentration in drinking water based on exposure to the gastro-intestinal tract. These values were calculated on the basis of limits quoted in the Radiation Protection Standards (HW-25457 Rev. 1) for continuous occupational exposure.

** July data included some values that were below detection limits. The detection limits were substituted for the real values which were unknown.

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<u>Reactor Effluent Activity Output</u>						
July 1957			June 1957		July 1956	
100-B	5	$\times 10^{-3}$ $\mu\text{c}/\text{sec.}$	23	$\times 10^{-3}$ $\mu\text{c}/\text{sec.}$	20	$\times 10^{-3}$ $\mu\text{c}/\text{sec.}$
C	24	"	45	"	22	"
KW	34	"	50	"	15	"
KE	36	"	49	"	29	"
D	23	"	17	"	6	"
DR	14	"	12	"	17	"
H	17	"	--***	"	6	"
F	16	"	21	"	8	"

*** 105-H Reactor down for 558 outage.

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PROCESS TECHNOLOGY OPERATIONREACTOR POWER LEVEL LIMITATIONS

Equilibrium reactor power levels were limited at the end of the report period approximately as follows:

<u>Reactor</u>	<u>Limit</u>	<u>Basis</u>
B	70 C bulk outlet temperature	Reactor safety consideration
C	920 kw maximum tube power	Fuel element failure control
D	950 kw maximum tube power	Fuel element failure control
DR	70 C bulk outlet temperature	Reactor safety consideration
F	900 kw maximum tube power	Fuel element failure control
H	850 kw maximum tube power	Fuel element failure control
KE	1225 kw maximum tube power	Fuel element failure control
KW	1275 kw maximum tube power	Fuel element failure control

GENERAL PROCESS ENGINEERING1245 Aluminum Jacketed 1/2" Cored Fuel Elements

It has been found, at KE Reactor, that the failure rate of 1/2" inside diameter cored 1245 aluminum alloy jacketed fuel elements is significantly higher than for solid elements at comparable heat generation rates. The test irradiation, initiated to determine the relative stability of this material, has been terminated at the KE Reactor. Steps are being taken to utilize economically the 125 ton inventory of this material canned to meet the program originally planned.

Process Tube Bowing - B and F Reactors

Process tube curvature, as the result of graphite moderator distortion, has progressed to the point where four-inch fuel elements are required in approximately 70 tubes at F Reactor and 55 tubes at B Reactor. Steps have been taken to procure additional four-inch fuel elements for use at these reactors. Reduction of this process tube bowing is being attempted by increasing graphite moderator temperatures in the area of maximum curvature. This is being done by skewing the flux toward the front of the reactors through control rod manipulation, lengthening fuel element charges, and moving fuel element charges upstream.

WATER TREATMENTAluminum Oxide Studies

A laboratory study of the feasibility of making aluminum sulfate solution from aluminum oxide and sulfuric acid continuously in modified existing equipment was completed. The study showed that the process is promising.

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DECLASSIFIEDManganese Removal from Raw Water

Laboratory and model filter plant studies of the variables involved in manganese removal from raw water have been completed and a report is being prepared.

Model Filter Plant Studies

Studies of filter materials and water treatment chemicals were continued.

PROCESS STANDARDSHW-33000 - Process Standards - Reactor

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

Process Standard A-050 - "Pressure - Flow During Reactor Shutdown"

Due to the necessity of performing maintenance on the temperature monitors at K Reactors, there are times when routine tube outlet temperature monitoring requirements cannot be followed during shutdown. The revision specifies a procedure that permits routine temperature monitor maintenance to be safely accomplished.

Process Standard A-090 - "Thermal and Biological Shield Cooling Water"

The revision contains new information on allowable foundation temperatures at the K Reactors. Control of foundation temperature is necessary to avoid excessive thermal stresses in the concrete pad below the membrane. Foundation cooling tube flows, allowable temperatures, and action to be taken if an off-Standard condition occurs are specified.

HW-46000 B - Process Standards - Reactor

Two revisions and one new Standard were issued during the month. These were:

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

The revision specifies a new setting for the LLP process water trip. The new setting will allow additional pressure decay time between the LP and LLP trips, thus reducing the possibility of an unnecessary ball drop due to inaccuracy, or drift, in the time delay relay setting. The new trip value was based on data from process pump trip-out tests conducted at D Water Plant on March 21.

Process Standard B-010 - "Sub-Normal Electrical Power Conditions"

The revised Standard specifies use of the emergency procedures contained in the most recent issue of "Procedures for Sub-Normal Electrical Power Conditions".

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HW-51703

Process Standard F-060 - "Operational Charge-Discharge Facility, C Reactor"

This is a new Standard permitting operation of the 112 tube ball valve facility installed at C Reactor on Project CG-651. Operation is permitted to the extent that heat generating slugs may be discharged during operation, but may only be charged during shutdown. This will remain in force until the charge machine is installed. Non-heat generating slugs may be either charged or discharged during operation.

HW-46000 D - Process Standards - Reactor

Four revised Standards were issued during the month. These were:

Process Standard A-020 - "Pressure and Flow During Shutdown"

New curves were issued for use in determining water shut-off times for process tubes containing heat generating slugs. The curves incorporate correction factors for helium and tube powers, thus giving more complete information in convenient form. The number of curves was reduced from 15 to 4. In conjunction with these curves, the 90 C surface temperature limit for slugs in water filled tubes has been deleted. The 90 C limit is no longer used because present practice is to drain the tubes and use the less restrictive 170 C surface temperature limit for miscellaneous tube work.

Process Standard C-060 - "Vertical Rod Withdrawal"

The Standard was revised to permit withdrawal of the VSR's with the Panellit system bypassed. This change reflects the changes made in Standard C-070 below.

The revision extended the list of conditions where reactivity status is known to be uncertain and the VSR withdrawal rate must be reduced to ensure reactor safety. Also, to minimize the possibility of a reactor runaway, the Standard contains precautions to be observed before starting up after a #1 safety circuit trip caused by an increase in neutron flux.

Process Standard C-070 - "Horizontal Rod Withdrawal - Power Increase"

The revision contains (1) a procedure permitting withdrawal of HCR's and operation at levels up to two megawatts with the Panellit bypassed and (2) allows use of faster rates of power rise for all start-ups. These changes will result in increased production without compromising reactor safety. Also the revision specifies reduced HCR withdrawal rates to ensure reactor safety under conditions where reactivity status is uncertain.

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

The revision permits charging enrichment at D and DR Reactors. Also, if necessary to enrich above the residual reactivity existing at 600 MWD/T the Standard requires that part of the HCR system be retained for disaster control during cold start-ups. Actual inhour value of the HCR's to be used as supplemental control is specified in the Standard.

DECLASSIFIEDHW-46000 F - Process Standards - Reactor

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

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

The curves presenting water shut-off time for drained crossheaders were revised following re-evaluation of the data. The new curves allow longer working time limits at an earlier time after shutdown than the old curves.

Process Change Authorizations

Nine Process Change Authorizations were issued during the month to permit temporary relaxation of Process Standards - Reactor, HW-33000 and HW-46000. Two Process Change Authorizations were issued during the month to allow temporary relaxation of Process Standards - Reactor Cooling Water, HW-27155 Rev. These were:

PCA #213 - "Bypassing Safety Circuit Trips on Process Water Pumps at 190-B, D, DR, F, and H Water Plants"

When starting up a process water pump, the number of unnecessary reactor outages can be reduced by bypassing the power loss circuit associated with the buss supplying the pump. Under these conditions, loss of one or two pumps will not immediately initiate a reactor outage. However, a reactor outage will occur if a complete loss of process pumping occurs (BPA failure). The bypassing procedure will not result in damage to effluent piping and is permitted as long as the bulk outlet temperature is not above 88 C. At bulk outlet water temperatures above 88 C, bypassing of any pump supplying reactor water is not permitted and any pump failure should initiate a reactor outage. The PCA clarified the relationship between the reactor bulk outlet temperature and the necessity for automatic shut down on loss of individual process water pumps supplying reactor water. PCA's #185 and #209 were superseded by this PCA. The necessity for coordination between Water Plant and Process Operation supervision with respect to bypassing pump power loss circuits was also emphasized.

PCA #214 - "Handling of Unirradiated .94 E Slugs - K Reactors"

Storage requirements of .94 E slugs, currently in the Standards, are the same as those specified for C slugs containing a greater percent by weight of U235. Until recently, this was not restrictive because E slugs were processed in small quantities. With the larger quantities being handled, the present requirements are restrictive. The PCA relaxed storage requirements of unirradiated E slugs to values consistent with the degree of enrichment.

PCA #215 - "Panellit System - F Reactor"

When the water pressure was raised for the June 13 start-up at F Reactor, tube 1268 was found to have a low tube pressure due to being left charged with perforated aluminum. As a result, the Panellit gauge could not be unbypassed and correction of the situation would have resulted in approximately two hours lost production. This PCA permitted bypassing the offending gauge until the reactor was shut down to discharge poison at which time

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HW-51702

a uranium charge could be inserted. Change out of the flexible connector was specified since cavitation flows would be in existence during the poison run.

PCA #216 - "Enrichment - D Reactor"

To minimize production losses, the PCA permitted enrichment beyond that specified in PCA #208 in order to compensate for loss of reactivity due to recent heavy discharges.

PCA #217 - "Charging of .94 E Slugs - K Reactors"

As noted in PCA #214, requirements for handling of .94 E slugs have been unnecessarily restrictive. The PCA relaxed the handling requirements for unirradiated and irradiated .94 E slugs to values consistent with the degree of enrichment.

PCA #218 - "Recirculation to Single Pass - KER Loop"

It was desired to switch the KER Loop from recirculation operation to single pass operation. During the change over, throttling of the back-up process water valve would have been necessary to prevent reaching the high flow trip. The trip is designed to shut down the reactor when high flows result from a downstream piping failure. However, it is desirable, during the transfer, to introduce process water at as high a flow as possible to ensure proper cooling. Therefore, since the high trip would not be caused by a piping failure, the PCA permitted not considering the high flow attained while switching from recirculation to single pass.

PCA #219 - "Flow Balance Valve - B Water Plant"

During pump repair at B Water Plant, it will be necessary to operate with a 2 - 4 pump configuration, which will result in a large riser pressure unbalance unless the flow balance valve is open. With the valve closed, mass Panellit gauge range changes would be necessary any time a pump change was made. Since the risk of line failure is small, the PCA permitted operation with the flow balance valve open while using the 2 - 4 pump configuration.

PCA #220 - "Panellit Base Checks - B Reactor"

Range changes were made to approximately 400 Panellit gauges during operation. During the next shutdown, checking of these gauge bases, as required by Standards, was overlooked until the reactor had been prepared for start-up. The PCA permitted reactor start-up without the base checks since: (1) these base changes had occurred during the previous operating period and had remained unchanged during the outage, and (2) the bases on all gauges associated with tubes that were charged during the outage had been checked.

PCA #221 - "HCR Instrumentation - H Reactor"

During CC-558, high pressure annunciator trips on gauges monitoring the H Reactor HCR cooling water pressures were inadvertently set 2 psi high. Since the small error represented no compromise to reactor safety, the PCA authorized operation with the above trip settings until the gauges are replaced on Project CC-705.

DECLASSIFIEDPCA #222 - "Water Leak - F Reactor"

After recent correction of two Van Stone leaks at F Reactor, the water collection rate remained above the value permitted in Standards. All indications pointed to another rear Van Stone leak. Since these leaks have little effect on reactor life, the PCA authorized operation until July 20, to permit scheduling of maintenance, provided no significant cold spots appeared and the dewpoint of the inlet gas remained below the inlet water temperature.

PCA #223 - "Charging of .94 E Slugs - H Reactor"

Requirements for handling of .94 E slugs have been unnecessarily restrictive. The PCA relaxed the handling requirements for unirradiated and irradiated .94 E slugs to values consistent with the degree of enrichment.

Process Assistance

Process Standards Operation covered the H Reactor Water Plant trip-out tests on June 24 and established the LP and LLP process water trips.

Process Standards Operation covered the initial start-up of H Reactor following completion of CG-558 modifications.

Process Standards Operation covered the initial start-up of C Reactor following completion of CG-651 modifications.

RUPTURE EXPERIENCE

<u>Failure Date</u>	<u>Tube Number</u>	<u>Lot Number</u>	<u>Type Metal</u>	<u>Exposure</u>	<u>Type Failure</u>
7-2-57	2479-C	TZ-299	8" Reg.	148	Charge Machine Damage
7-4-57	3578-D	PT-IP-43A	8" Reg.*	295	Side H.S.**
7-14-57	1868-B	M-273	8" Reg.	371	Unclassified
7-17-57	1587-DR	A-121	8" Reg.	136	Side H.S.
7-18-57	1464-C	A-103	8" Reg.	278	Side H.S.
7-19-57	2372-KE	PT-IP-43A	8" Reg.	607	Side H.S.
7-21-57	1461-C	PT-IP-1A	8" Solid "E"***	1226	Unclassified
7-24-57	2663-C	PT-IP-1A	8" Solid "E"***	1053	Side H.S.
7-28-57	3285-DR	Z-343	8" Reprocessed	207	Side H.S.
7-30-57	3572-DR	A-125	8" Reg.	208	N.A.
7-30-57	2747-KE	K-595	8" Reg.	461	N.A.
7-31-57	2380-DR	A-125	8" Reg.	213	Side H.S.

* Canned in M-388 alloy jacket.

** Intergranular corrosion not evident in the overheated region.

*** 1.44 per cent enriched.

Legend:

Side H.S. - Failure probably caused by local overheating (hot spot) and possibly intergranular corrosion.

Unclassified - Failure type does not fit into any particular category.

N.A. - Not Available.

OPERATIONAL PHYSICS OPERATION

PILE PHYSICS ASSISTANCE

The use of enrichment spread to all piles during July when F Pile charged sixteen E columns. Further additions for reactivity gain at the nine-rod piles should not be necessary until various temperature limits are relaxed to permit further power increases. All additions and replacements during this report period were made with E metal.

Following completion of all of the CG-558 outages the PCCF equipment, half-rods, lower exposures, and modest enrichment have resulted in better average flattening in spite of higher power. If the mechanical problems associated with splines can be overcome soon, it is probable that further improvements can be made in spite of expected power increases during the next cold-water season.

Work has continued on the problem of the accuracy of the Beckman Recorders and No. 1 Galvanometers when subject to fast reactivity rising periods. Tentative results show that the recorders at 105-KW, 105-KE, and 105-F are accurate to full scale at approximately one second rising period and 80% of the scale is accurate down to about a 0.90 second period, whereas recorders at 105-H are accurate to full scale at approximately a 20 second period and 80 per cent of the scale is accurate at a 16 second period.

Operational Physics Quarterly Forecast reports for the third calendar quarter of 1957 were issued early in July as HW-51088 through HW-51092 for B, C, D & DR, F and KE & KW Reactors. No forecast was made for H Pile because its post CG-558 operation had been covered in an earlier report.

Table I lists some items of physics interest for July; the ECT values for B, D, DR & F averaged more than 1400 for the first time.

TABLE I - SUMMARY OF OPERATING DATA OF PHYSICS
INTEREST FOR THE MONTH OF JULY, 1957

Pile	B	C	D	DR	F	H	KE	KW
ECT ¹ In June	1330	*	1390	1500	1415	1510	2415	2430
12 Mo. Avg. ECT	1320	1575	1385	1440	1330	1560	2360	2390
Equil. Scram Time ² (~27)	(25-30)	(15-25)	(25-30)	(28-32)	(~50)	(14-20)	(18-22)	
No. of Scrams & Recoveries ³	10 8	3 3	2 2	2 2	0 0	4 3	1 1	9 8
No. of Non-Scram Outages	4	4	1	2	2	2	2	2

* Just starting up from CG-651 outage at end of reporting period.

1. Effective Central Tubes; this value is defined as the pile power divided by the average of the ten most productive tubes in the pile.
2. This is defined as the maximum time available in minutes between scram and the first indication of start-up.
3. Includes all instantaneous shutdowns, equilibrium or non-equilibrium and "quickie outages from equil. and from which recoveries were attempted.

DECLASSIFIEDPILE PHYSICS ASSISTANCE (Continued)B Pile - J. T. Worthington and W. R. Smit

Nine spurious scrams occurred during the report period; most of these are believed due to loose connections in the Panellit system. Prediction accuracy was quite good in every case, and all but one recovery was smooth and uneventful. During the recovery of 7-10-57 at about 7:20 a.m. a 12 second period was observed according to incomplete data. The rate of power increase in the hundreds of MW range was excessive also, and intended recovery level was temporarily exceeded by approximately 10%.

During the July 10 to July 14 operating period the PCCF charging machine became stuck on tube 1181 during the poison discharge, and equilibrium flattening adjustments could not be made.

One "quickie" attempt on 7-19-57 gave good scram recovery data; no rupture was found and a recovery was made at 27 minutes; the predicted maximum recovery time was 26 minutes.

Operation under PT-IP-26-A, the high temperature graphite annealing test, has continued without incident or difficulty. The higher graphite temperature has provided about forty inhours more reactivity which contributes to the improved flattening.

C Pile - F. C. Franklin and D. T. Houser

Operating continuity was interrupted by two minimum shutdowns for slug ruptures, one scheduled outage, one temporary poison outage, two panellit scrams, and one flux monitor scram. The scheduled outage was for installation of the 111 tube operational charge-discharge facility under Project CG-651. During the ten day outage, horizontal control rods 2, 5, 8, 11, and 14 were replaced with half-rods of a new design. The charge-discharge equipment is limited to non-heat-producing slugs until a new charging machine can be installed next month. A new best estimate rod calibration was drawn up to take into account the five new half-rods. It was assumed that they each have the same strength as the old half-rods (5 and 11). The rod withdrawal order was revised in order to make maximum use of the new rods during transient and equilibrium operation. All permanent poison was discharged so that sufficient reactivity would be available to use all the half-rods at equilibrium.

The cold start-up PC chamber was somewhat erratic during the start-up following the CG-651 outage. This chamber, which had been in service for about a year, was replaced during the temporary poison outage. The new chamber operated satisfactorily during the following start-up but showed a background counting rate approximately ten times normal during the next outage. A replacement chamber was not available so start-up was made using the hot start-up chamber. The hot start-up chamber is sensitive to approximately 100 watts.

PILE PHYSICS ASSISTANCE (Continued)**DECLASSIFIED**D Pile - G. R. Parkos

The lack of reactivity caused by a low plutonium inventory and the 3X balls left by the June ball drop has prevented full utilization of the rupture control limit at all times. Operation was continuous from 7-6-57 to 7-22-57; however, a severe control problem developed on 7-9-57 which was taken care of by judicious PCCF and HCR manipulation. The problem was brought about by the use of half-rods without enough compensating short-rod tips. Since D Reactor is short of reactivity, this situation is quite likely to arise following any start-up unless exceptionally careful control is maintained. Once the cycle was stopped, the power level was increased until tube power became limiting. Flattening adjustments were made, and the power level and ECT at report time were the highest attained since the CG-558 start-up.

VSR channel #20 was inspected during the outage of 7-4-57, and balls were observed at several levels in the stack. After an electromagnet had been lowered 26 feet into the channel, borescoping revealed that about 50% of the visible balls were removed; further work will be done during the next outage.

A chunk of slag about the size of a marble was found in the cone screen of #1574. This tube had operated at a calculated tube power about 10% higher than the average of the four surrounding tubes throughout most of the previous operating period. There is evidence of false flow data on several other tubes which will be examined during the next outage.

DR Pile - R. D. Carter

An effective central tube value of 1500 was achieved by use of the PCCF and under otherwise favorable conditions; this is an all time high for a pile with so little enrichment.

During the 7-17-57 start-up a modest initial rising period was changed to an excessively fast period by improper use of the half-rods. They were inserted from the "centered" position to "all-in" in an effort to reduce the rate of rise; when the rate of rise was observed to be increasing, the pile was manually scrammed from a level of about 300 MW. This emphasizes the need for explicit rod withdrawal and insertion procedures during the initial phases of a start-up and for the rate-of-rise meter, preferably with trips.

F Pile - C. E. Bowers

During the past few months, an increasingly severe graphite growth problem has been observed at F Pile. Study has indicated that significant distortion exists toward the front of the unit, and as a result several tubes have had to be charged with four inch metal in order to "get over the hump". Two remedial changes were made during the outage of July 17, in an effort to either halt or considerably slow the graphite growth:

1. All tubes below 36 row are being charged with one extra downstream dummy and one additional HM slug. These tubes are lengthened only as normally scheduled discharges permit.

PILE PHYSICS ASSISTANCE (Continued)**DECLASSIFIED**F Pile - C. E. Bowers (cont.)

2. Downstream rods are being used for equilibrium control in preference to center or upstream rods. At F Pile this involves a change-over from the use of 5 rod to the use of 4 rod.

Both these changes have been initiated in an effort to skew the flux distribution toward the front of the reactor. Another possibility currently under consideration involves the use of partial charges of enrichment, displaced upstream.

A near-cosine front-to-rear flux traverse was obtained prior to the rod and loading changes mentioned above by the use of solid aluminum pieces and the PCCF.

Sixteen tubes were charged with "E" metal during the outage of July 17 which will allow 40 inhours of flattening in the PCCF with approximately 320 inhours in rods at equilibrium. Enrichment was made necessary by rather heavy discharges during July and anticipated similar discharges in August.

The most sensitive PC chamber failed during or just before one start-up, but it was possible to use the No. 1 Galvanometer since its sensitivity was known to be ~200 watts from a previous test.

H Pile - G. R. Gallagher and W. R. Smit

The CG-558 outage ended on 7-4-57. Because of mechanical interference on the experimental levels no sub-critical instrumentation was used as had been done for other CG-558 start-ups. The initial rising period was 10-15 seconds. The most sensitive (cold start-up) chamber did not appear to be working, so the scaler was switched to the hot start-up chamber. Later inspection showed that the bias was improperly set and subsequent start-ups have shown that both the hot and cold PC chambers work well. The conclusion is that the initial fast period was caused by lack of instrument sensitivity and by larger than normal reactivity increases with rod withdrawal; flux distortions affecting the calibration were caused by the large amount of poison used for the start-up. Sub-critical instrumentation appears to be the best answer, especially following an extended outage involving so many pile modifications.

A scram occurred at 0135 on 7-8-57 when 190-H changed a pump, but a successful recovery was made. Two panellit scrams on 7-9-57 made the reactor subcritical for a minimum outage. After the second scram a faulty relay was found on #9 row. When the power was turned on to the Ball 3X system in preparation for the start-up on 7-10-57, one of the ball hoppers dropped enough balls to fill the channel approximately 3/4 full.

After the start-up, a number of PCCF tubes needed to be charged for turnaround at 1150 MW. A clogged high pressure water line to the charging machine delayed charging of the necessary PCCF tubes until a power cut was necessary to reduce tube temperatures. A scram occurred at 0048 on 7-12-57 when the wrong ball valve was opened to discharge some temporary poison. A recovery was made from this scram.

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PILE PHYSICS ASSISTANCE (Continued)**DECLASSIFIED**KE Pile - W. S. Nechodom

It is expected that the in-pile inventory of cored slugs will be reduced to about 470 tubes by 8-1-57, permitting an increase of approximately 2% in the rupture control point.

A trip was caused on June 24 by a flux shift to the top of the reactor which permitted the tube outlet temperature to reach the preset trip point on a 1706 KE tube; other recorded data indicate that normal tubes in that region would have reached their trip points shortly if the 1706 tube had not tripped. The flux shift to the top of the reactor was caused by over-correcting rod movements.

Preliminary observations indicate that the installation of a half-rod in the No. 18 position has resulted in a definite gain in flattening efficiency with very little increase in control problems resulting from the change. Operation will continue for another two months under these conditions before further half-rod installations are recommended.

All controls for the gas makeup and purge systems have been moved into the control room to provide easy access and speedy purges for scram recoveries. While the purge system has not yet been required, the system has provided better equilibrium control of the gas makeup and associated reactivity changes.

KW Pile - D. E. Goins

A new maximum equilibrium power level $4 \frac{1}{2}\%$ higher than the previous maximum was achieved this month. Most of this increase was possible because the total pile flow was increased six per cent. In addition to a scheduled and an unscheduled outage there were nine scrams during this report period with eight successful recoveries; six of the scrams were spurious. There were no fast initial periods during the scram recoveries; however, there was a prediction error of ~ 100 ih involving the second scram of a pair. The rates of power increase in the megawatt region were not excessive.

A new technique of reactor control at turnarounds was tried during the start-up following the poison discharge on July 7. The technique of swapping center for bottom horizontal rods proved very successful in forcing turnaround and controlling tube outlet temperatures. More tests of this procedure will be carried out on start-ups in the future.

PROCESS PHYSICS STUDIESE Metal Usage

Enrichment demands for reactivity and fringe poison during the next few months have been carefully considered from the standpoint of minimum inventory during this interval. Until E metal becomes available in I & E form there remain uncertainties in defining the permissible goal exposure; therefore, it is desirable to build some inventory as a hedge against having to cut goal exposure on E metal.

DECLASSIFIEDPROCESS PHYSICS STUDIES (Continued)E Metal Usage (cont.)

It appears at this time that we will be able to meet our foreseeable enrichment requirements for reactivity and fringe poison as well as to build a small inventory during the next three months. Planning is also underway to permit use of the E metal in I & E form as soon as it becomes available.

Shield Protection and Fringe Poisoning

H Pile top shield temperatures following their CG-558 start-up have been quite high as expected from DR observations. B Pile top shield temperatures have also become excessive as a result of the high graphite temperature annealing test. Meetings were, therefore, held with B and H Processing management to define the problems and the indicated action. Detailed loading instructions have since been forwarded to these areas for use during outages in the near future. A solid mint layer is proposed for the H Pile, whereas a partial mint layer is proposed for the B Pile with the decision to poison further depending on initial results and on future graphite test plans.

The fringe poison production test using depleted uranium was re-written for the far side of the B Pile ; this location appears optimum as the depleted load can provide some shield cooling but to a limited extent.

A development test is being prepared for utilizing the shield neutron detector facilities installed during the CG-558 outages at the five older reactors. Because of the time required for obtaining authorization signatures, data procurement is being attempted initially on an informal basis.

Reactor Safety Studies

The multi-region one-group critical flux distribution problem has been referred to the Reactor Physics Operation for programming on the analog computer. If this can be accomplished, considerable time will be saved in the detailed solution of these problems. The enrichment status of all reactors is being monitored routinely to ensure that the current control philosophy is not violated, and variations of this same basic type of problem come up frequently. Another variation being worked on is the effect of fringe poison and compensating enrichment. Intuitively, a reactivity-balanced shield protection loading would be expected to have little effect on control capacity, but a formal solution should indicate to what extent such a rule of thumb would be valid.

Considerable effort has gone into calculating the control effectiveness and requirements of the safety systems under postulated future operating conditions. The results of these studies will be included in a presentation to the AEC Reactor Hazards Evaluation Group of background on our safety studies and on our bases for feeling that a modification of our total control philosophy is in order.

A reactivity acceptance test procedure for the poison material to be placed in the modified DR and H vertical rods has been prepared for use in the design change document.

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PROCESS PHYSICS STUDIES (Continued)**DECLASSIFIED**Horizontal Rod Calibration - C Pile

A production test for a partial calibration of the C Pile HCR system is in rough draft form, ready for detailed discussion with C Processing Operation personnel. In addition to the fact that C Pile rods have a round cross section compared to oval at the older reactors, the central bank of 2, 5, 8, 11, and 14 were all replaced during July and are now all half rods. It is expected that the calibration covering equilibrium and scram recovery configurations will be carried out early in the fall.

Arrangements have been made to salvage cadmium cans from the replaced C Pile rods for burnout studies. Tentatively planned are isotopic analyses of cadmium and gold foil cadmium ratio measurements in the test pile. Calculations of the useful life of these rods had been requested from time to time in the past; the calculation of the flux distribution close to a rod, particularly as affected by burnout, is subject to large uncertainties.

Potential Gains Data

The older reactors continued to show very high flattening efficiency, and the K's also showed improvement over the previous month. The reduction in goal exposure during recent months, while causing a loss in reactivity flexibility, results in much less severe discharge cycles. This factor has combined with ball valve facilities and light enrichment at the old piles to give these improvements.

Non-equilibrium losses continued to average around 5%; improvements such as the ball valve system are offset in part by more severe operating levels. The large F Pile loss was due largely to an extended low level start-up in lieu of a poison push during their post CG-558 readjustment period. The KW losses were associated with three start-ups in which nearly a day's effective production was lost in each case during the climb to full level.

POTENTIAL GAINS¹ - OPERATIONAL PHYSICS ASPECTS
JUNE 16, 1957 THROUGH JULY 15, 1957

Reactor	B	C	D	DR	F	H	KE	KW	AVG.
Equil. Potential With Existing Limits ²	1.2	3.6	0.3	0.3	1.1	4	3.8	3.1	1.9
Non-Equil. Potential ³									
Operating	5.9	3.1	3.0	1.2	7.5	0.9	5.0	7.3	4.2
Temp. "P" Outages	0.0	0.0	1.4	0.6	0.8	0.0	0.8	1.5	0.6
Total: Non-Equil.	5.9	3.1	4.4	1.8	8.3	0.9	5.8	8.8	4.8

1. A complete explanation of these potential gains is contained in HW-47602, "Determination of Potential Operating Gains".
2. Per cent to be gained if desired flattening changes could be made. The average value does not include H Reactor which was doing for CG-558 during the major portion of the report period.
3. Per cent to be gained through elimination of non-equilibrium losses. These are based on 30 days of normal operation.
4. Equilibrium data not obtained between CG-558 start-up and July 15.

DECLASSIFIEDPROCESS PHYSICS STUDIES (Continued)Significant Operational Physics Documents Issued During the Month

- HW-50316, "Production Test IP-14-AC, Use of E Metal in Shield Protection, Supplement A", W. L. Bunch and L. W. Lang, June 23, 1957, (Secret).
- HW-51075, "Reactivity Balance and Associated Reactor Physics Data, June 1957", S. R. Stamp, 7-5-57, (Secret).
- HW-51360, "In-Pile Scheduling of E Metal", G. C. Fullmer and G. F. Owsley, July 12, 1957, (Confidential).
- HW-51088, "Operational Physics Quarterly Forecast For B Reactor, July through September, 1957", J. T. Worthington, July 1, 1957, (Secret).
- HW-51089, "Operational Physics Quarterly Forecast For C Reactor, July through September, 1957", F. C. Franklin, July 1, 1957, (Secret).
- HW-51090, "Operational Physics Quarterly Forecast For D Reactors, July through September, 1957", G. R. Parkos and R. D. Carter, July 1, 1957, (Secret).
- HW-51091, "Operational Physics Quarterly Forecast For F Reactor, July through September, 1957", C. E. Bowers, July 1, 1957, (Secret).
- HW-51092, "Operational Physics Quarterly Forecast For K Reactors, July through September, 1957", D. E. Goins and W. S. Nechodom, July 1, 1957, (Secret).

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IRRADIATION TESTING OPERATIONKAPL 120 LOOP

The empty loop has been on process water cooling during all periods of reactor operation. The following activities are in preparation for charging a Westinghouse fuel train and going on recirculation in September:

1. Electrical connections to the replaced line heaters are completed.
2. A building has been procured to cover the loop discharge basin and plans are completed for the renovation of the basin.
3. Charge-discharge of the WAPD fuel element train (in the in-pile tube) was successfully demonstrated utilizing a mocked-up fuel piece.

The information required to establish code compliance intent, with respect to the construction of the loop as well as subsequent maintenance and modification, is being compiled in document form. Comments on the rough draft are expected early in August. The x-ray inspection of a sample group of welds is complete. The pictures which have been read show excellent welds. Arrangements are being made to replace several valves which are questionable as to code compliance.

100 DR RECIRCULATING GAS LOOP

A meeting was held in Washington, D. C., on July 10-11, in an attempt to resolve the several problems which had arisen concerning the Loop. The meeting was attended by representatives of the Army Reactors Branch and the Maritime Reactors Branch and personnel from Project Engineering, Hanford Operations Office, and Irradiation Testing Operation. The meeting led to the following conclusions: (1) The increase in the cost of the nitrogen-cooled facility (\$731,000 to \$835,000) was accepted as reasonable and justifiable since it resulted primarily from escalation beyond the predicted five per cent per year (an additional \$88,000) and a higher cost for the special compressors than had been estimated (an additional \$52,000). (2) The Loop must be adaptable for operation with both nitrogen and helium. A firm basis for the helium conversion was established (a heat removal capacity of 50 KW with an outlet temperature of 1250 F). A cost increase of \$35,000 was assigned to this modification. (3) Army Reactor personnel stated that they considered it possible, although not probable that a ruptured fuel element might stick in the in-pile tube (this is contrary to information from ANP wherein they have reported no gross swelling upon the failure of fuel specimens). In view of the Army personnel's comments, however, it was decided that the in-pile tube removal equipment which was to have been provided some time during the first five years' operation would have to be provided prior to start up. A sum of \$30,000 was allotted. (4) The total installation cost was established at \$900,000. (5) The start-up date for the facility will be January, 1959. This is contingent upon receiving funds in sufficient time to take advantage of the bids which are currently being received and the receiving of subsequent funds when required.

The Project Engineering Representative and the Irradiation Testing Operation Representative attended a meeting at Battelle Memorial Institute on July 12. The Army and Maritime representatives were present and personnel from BMI and ORNL attended. The meeting permitted an exchange of information regarding the problems and progress of all four in-pile loops associated with the Gas-Cooled Reactor Program.

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It also resolved the one remaining question regarding the 100 DR loop, i.e., gas-lubricated versus oil-lubricated bearings for the compressors. BMI is following the approach of oil lubrication plus seal. Their cost is in the same range as HAPO's and there is no assurance that the equipment will perform satisfactorily. It was decided that HAPO will continue the gas lubricated approach and BMI will remain with oil lubrication until the respective merits have been established.

Procurement and fabrication will be resumed upon receipt of formal authorization from the AEC. Comments received from the Army Reactors Branch and which concern minor features of the loop design are being reviewed.

NEUTRON FLUX STUDIES

Rise factor measurements were obtained for empty sample holes in a seven tube magazine facility by means of mock-up studies in the Hanford Test Reactor. Rise factors for the individual sample holes varied less than five per cent. The average rise factor for an empty sample hole was found to be 2.2. The magazine facility was found to produce a flux depression in the adjacent uranium columns of approximately five per cent.

GAMMA HEATING STUDIES

Two calorimeter experiments were conducted in a KW Pile Snout facility to measure pile radiation heating. The first experiment, designed to measure the heat generation rate in Inconel-X, indicated a rate of greater than 0.6 watts/gm in the central zone of the pile when operating at 3000 MW. This value was far higher than the calorimeter could accurately measure. A calorimeter of a new design is being fabricated to confirm this measurement and other possible sources of error are being studied.

The second calorimeter experiment measured a heat generation rate in 2-S aluminum of 0.22 watt/gm in the central zone of the reactor when operating at 3000 MW.

HAPO FUEL ELEMENT IRRADIATIONS

Two seven rod cluster fuel elements in a basket (HAPO-195) reached goal exposure and were discharged from test hole 3674 KE on July 25. The tube has been made available for the irradiation of "B" metal until other experiments are authorized.

The water stream temperatures of eleven (11) tubes in C reactor and two (2) tubes in KW reactor charged with I & E cooled fuel elements are being monitored (HAPO-159). The temperature data have remained the same as reported last month.

The 2.1 inch ID inner tubes for the K pile front-to-rear test holes have been successfully extruded. However, it was necessary to use an annealed billet to obtain the desired dimensions. The vendor reports that heat treatment has been completed and the tubes can be expected on plant by mid-August.

The in-pile tube of the ORA-2 loop is plugged. A replacement tube is being fabricated for installation in the 2A test hole, KE pile. The target date for the removal and installation is late August (HAPO-182).

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The third North American safety fuse device was discharged from DR reactor on 7-16-57. As previously reported, excessive BF_3 gas pressure ruptured some part of the BF_3 containment system early in the test run (HAPO-162-NAA-109). This concludes the tests which were to be run at Hanford.

In support of an investigation of neutron damage to various metals being carried out by HLO, six (6) capsules each containing metallic tensile specimens were irradiated in and discharged from KE magazine facility during the month. (HAPO-112). Specimen temperatures were maintained below 105 C by using helium as a heat transfer medium in the magazine facility. The temperature of one set of specimens was monitored by a thermocouple.

Two gamma heated assemblies each containing samples of MIPB were irradiated in the Snout Facility at KW reactor. These assemblies were designed to operate at 370 C and 400 C. The thermocouples used to monitor the sample temperature indicated equilibrium temperatures of approximately 70 C and 50 C. Three similar assemblies were irradiated previously and the indicated sample temperatures were near the design point. A complete explanation of this apparent discrepancy must await post irradiation examination. One of the quartz capsules containing MIPB is known to have ruptured during irradiation (run #5). The leaking fluid was controlled and the assembly discharged without spread of contamination.

OTHER IRRADIATION TESTS

1. Eight sets of activation analysis samples (HAPO-184) were irradiated in the Poison Column Control Facilities at D, DR and F piles. This activity is in support of a Washington designated program assigned to HLO.
2. One set of flux monitor foils was discharged from the 36" Shield Plug Facility at C pile. This irradiation is in support of a shielding material study being conducted by HLO.
3. One UO_2 sample (HAPO-203) was irradiated in the Quickie Facility (E test hole at F pile to provide a Np^{239} tracer in support of HLO chemical separations studies.
4. Two sets of flux monitors were irradiated in the D test hole of DR pile (to provide side fringe flux traverses before and after poison installation) in support of Shield Protection studies (HAPO-194).
5. Three samples of effluent water residue (HAPO-172) were charged into the Quickie Facility (E test hole) at F pile, in support of a HLO study of isotopes in effluent water.
6. One set of HAPO-202 samples were irradiated in a Poison Column Control Facility at DR pile supporting an HLO study of impurities in organic coolants.
7. Two charges (numbers 3 & 4) of special slugs (WAPD-114A) containing canned uranium oxide fuel in a NaK bath were charged into DR pile. The radial neutron flux distribution in these 0.3625 inch diameter UO_2 fuel pellets having a 7.69 w/o enrichment, was measured by means of an irradiation in the Hanford Test Reactor. Pins of 7 w/o U-235 aluminum alloy were used in the experiment as the flux detector. A disadvantage factor of 1.14 was measured for the fuel. These activities are in support of a fission gas release study being carried out by Bettis Plant (Westinghouse).

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8. One-hundred and thirty-three samples began exposure and one-hundred and sixteen samples completed exposure in the Hanford (KE) gamma facilities.
9. Four AF-100 canisters began exposure and four canisters completed exposure in the Air Force gamma facilities (KE).
10. One charge of cobalt (ORNL-183) was charged in a central zone process tube at C pile.
11. Two charges of special slugs (KAPL 123) containing canned uranium oxide fuel in a NaK bath were irradiated in the Poison Column Control Facilities at DR pile. One charge of the same material was discharged from a standard process tube. This irradiation is in support of a study to separate fission product damage from neutron damage being carried out by the Knolls Atomic Power Laboratory.

A rise factor calculation was performed using the IBM 650 computer for each of three HAPO 213 thorium samples. Rise factors obtained were as follows:

<u>Diameter of Thorium Sample</u>	<u>Rise Factor</u>	<u>Sample Type</u>
0.250 inch	1.87	Tensile specimen
0.0450 inch	1.78	Impact specimen
0.500 inch	1.76	Thermal & electrical conductivity

These data were obtained to aid in the design of an irradiation test being planned by HLO.

TEST FACILITIES

An examination of the aluminum pigtail which failed in service on test hole 0065 KE has been completed by the Metallurgy Laboratory, HLO. A micrograph of the visibly damaged area approximately five inches downstream of the orifice clearly indicates that failure was due to cavitation. The aluminum pigtail, which was installed in error on 4-3-57, failed on 6-16-57. This pigtail may have seen service during prestart up testing at KW. A stainless steel pigtail of the same design and which had been in service under the same conditions since October, 1955, was removed from test hole 0065 KW pile during June, 1957. Metallurgical examination of this pigtail disclosed no evidence of damage. All aluminum pigtails which could be used in this or similar locations have been destroyed.

Components are on order and/or shop fabrication is under way on the items required for the modification of the 36" Shield Hole Facility and the Spout Casks.

As of July 22, the modification of the Irradiation Testing Operation's Laboratory in 105 KW was 30 per cent complete.

A second gamma irradiation tube utilizing cobalt slug sources was placed in service in the KE basin. Each of the two tubes now present a dose rate of 1.34×10^6 r per hour.

VERTICAL BOWING MEASUREMENTS

Vertical bowing measurements were made from front on five process tubes. The results are tabulated below. Distances are measured from the front vanstone.

<u>Date</u>	<u>Tube</u>	<u>Results</u>
7-8-57	4574-B Front	Up 0.12" at 8'4" since 5-14-57 Down 0.15" at 18' since 5-14-57
7-8-57	1675-B Front	No previous data
7-8-57	1673-DR Front	No previous data
7-18-57	4676-F Front	Could not push short model traverse head beyond 9'2". Long model head stuck at 9'4" on 6-12-57.

BORESCOPING

Twelve (12) process channels were borescoped at 105-H on 6-25-57, and 6-27-57, to assist Maintenance in evaluating channel damage and methods of correction prior to tube insertion. Five (5) C metal tubes were borescoped at KW to check for possible damage resulting from chattering. No significant damage was noted.

The side hole, R.S. #9, KW pile, was borescoped from the X-level side on 7-5-57. Significant damage on the inner end of the gun barrel was noted and reported.

VSR #2, D pile, was borescoped to determine the effectiveness of an electro-magnet in removing "balls" lodged in the graphite at the block junctions. Examination before and after indicated the magnet was effective.

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COOLANT TESTING OPERATION

Coolant Testing Operation activities during July included the operation of the 1706 in-pile and out-of-pile facilities, the operation of the KER loops and the continuation of the organic coolant program.

1706-KE SINGLE PASS TUBES

Operation of the six single pass tubes with weighed and numbered regular production slugs continued under the established programs. Charges in four of the tubes were replaced during July. The tubes operated in pairs at pH's of 6.0, 6.5 and 7.0. Tube 2943 continued operation on high temperature, pre-heated, 90°C water for the determination of radiation effects on corrosion tests.

MOCK-UP TUBES

The steam supply to the mock-up tubes was out of service during the month to permit replacement of steam jacketed drain piping. The replacements have been completed and the facility is undergoing hydrostatic tests.

A program for the determination of corrosion rates for M-388 and carbon steel in low temperature 6.5 to 7.0 pH process water was continued during the month.

ELMO LOOPS

ELMO-1 - ELMO-1 was not operated during the month since its operation is dependent on steam supply to the mock-up tubes.

ELMO-2 - ELMO-2 remained out of service during the early part of the month while undergoing installation of a new canned motor pump. Installation of the new pump was completed and tests run on the loop preparatory to installing coupons for corrosion tests.

ELMO-5 - ELMO-5 continued to operate at 290°C at a pH of 9.0 for corrosion tests on carbon steel, aluminum, stainless steel and Zircaloy-2.

ELMO-6 - ELMO-6 was utilized for aluminum alloy corrosion tests in high temperature 300°C water during the month. Tests were performed with 150 ppm phosphate and a pH of 4.5.

ELMO-7 - ELMO-7 was operated intermittently for the purpose of testing KER fuel elements. During July the KER tube high temperature burst testing equipment was connected to the loop.

ELMO-9 - A test of 300 ppm Virco-Pet 20 organic phosphate inhibited water on aluminum corrosion was completed during the month. A test of the corrosion and inhibiting properties of Alzarin Red S is now in progress.

KER FACILITY

In-pile recirculation of Loop #2, with M-388 jacketed collapsible rail 1/2" cored uranium slugs continued until July 26. Phosphoric acid was used to regulate the pH at 4.5. On July 26 these elements were discharged and replaced with a

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charge of ten large diameter I&E cow slugs.

Final testing of Loop #3 components was completed on 7-8-57, and in-pile recirculation with M-388 jacketed collapsible rail 1/2" cored uranium slugs in high purity water was initiated.

Loops #2 and #3 operated at specified conditions of 180°C until July 29, at which time failure of a transformer in the pump control circuit controlling the #1 pump in all loops stopped these pumps, causing a reactor scram. Immediately temperatures on Loops #2 and #3 were reduced to allow one-pump operation conditions. As soon as these conditions were established, the reactor was allowed to recover. Total outage time was thirty minutes, resulting in an estimated 530 MWD production loss.

No replacements for the failed transformer are available on-site, due to the specialized nature of the application. No delivery date has been established for off-site procurement.

After the June shutdown of the #4 Loop an inspection of the #1 pump impeller revealed that the stellite facing on the hub was chipping off. The stellite was removed by grinding, replaced with weld metal and machined smooth. The pump has been reassembled and tests will proceed on the loop as soon as the new transformer has been installed.

The changes in the regulated voltage system have improved the stability of the KER instrumentation. We are still troubled with occasional "blips" on the recorders but none of these have yet been serious enough to interrupt operation.

During the period when two KER loops were operated with regular slugs it became apparent that some of the temperature elements were inaccurate. During the month tests were run to attempt to determine cause of the inaccuracies. Analysis of the test data is not yet complete.

ORGANIC COOLANT TEST PROGRAM

ORA-1 - ORA-1 remained out of service during the month for installation of additional fuel element testing facilities, as required by the Coolant Systems Development Operation. Installation of these facilities is now underway.

ORA-2 - ORA-2 was shutdown on 7-3-57 when the in-pile section became plugged. Apparently a small amount of MIPB had been left in the test section when the loop was removed from service several months ago. This material formed tar under irradiation, which resulted in a restriction in the in-pile section. During the ten days of operation the tar content of the tertiary eutectic increased from 0 to 25% and the viscosity increased from 20 to 60 centistokes.

ORA-3 - Hammel Dahl valve tests in ORA-3 progressed successfully during July.

Brookhaven Loop - The Brookhaven loop arrived on site on July 19. Due to its large size and contaminated status difficulties are being encountered in finding enough space in which to do out-of-pile testing preliminary to moving to X-1 Level, 105-KE, for in-pile use.

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KER Loop #1 - Progress in the conversion of Loop #1 to organic coolant test facility was interrupted during July, until approval of additional expenditures can be obtained. We are proceeding with action on a project proposal to cover the conversion.

Naval Research Contract - Arrangements for the R&E Operation to support the NRL organic coolant program for Fiscal Year 1958 were completed during the month.

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COMPONENT TESTING OPERATION

IRRADIATED MATERIAL EXAMINATION

Detailed examination of 49 tubes of irradiated metal was completed during the month. Four overtime Saturdays were worked to complete examinations on production tests of particular interest to the Fuels Preparation Department and Hanford Laboratories Operation.

Work has started on the fabrication of an underwater borescope which will permit visual examination of the interior surface of I & E slugs. The borescope will be installed at the 105-C MEF.

PROCESS TUBE CORROSION MONITORING PROGRAM

Nine pile process tubes were examined in basin facilities and samples from 12 tubes were measured in the Metallurgical Laboratory. Examinations conducted on leaker tube 2980-D showed that a combination of internal and external corrosion caused the tube leak. A 20 mil average wall thickness was found in the vicinity of the hole.

In-pile Probolog measurements were made on 132 process tubes. These measurements were made to obtain additional corrosion information and to assist in selecting tubes for replacement. A comparison of the results of in-pile measurements with new tube wall thickness calculations for 149 tubes showed a maximum difference of seven mils. This is a marked improvement over comparison made between in-pile measurements and earlier tube wall calculations.

Details of tube examinations conducted during the month are included in the following reports:

<u>REACTOR</u>	<u>NUMBER OF TUBES</u>	<u>REPORTED IN</u>
B	56	Report #58, HW-51333 (Unclassified)
C	13	Report #59, HW-51380 (Unclassified)
DR	63	Report #60, HW-51415 (Unclassified)

PANELLIT PROGRAM

Failure analysis was performed on 110 panellit gauges and 590 gauges were process inspected.

At the request of Process Technology Operation 11 panellit gauges were tested to determine the possibility of compromising panellit gauge reliability if trip spans are increased from 50 to 80 units on the gauge dial. Linear error of the gauges was checked throughout their entire range. Eight of the gauges were free from error and three were found to contain a small linear error directly proportional to the distance of dial travel.

Five hundred panellit switch brackets of a new type were received and tested for specification adherence and functionability. The brackets were found to conform to specifications and are functioning properly. Engineering approval for continued production was forwarded the vendor.

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PANELLIT PROGRAM - (continued)

Several hundred K panellit junction boxes have been received. These junction boxes are working very satisfactorily. Earlier production models were inadequate and required alterations to meet specifications.

INVENTIONS

All Research and Engineering Operation personnel 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 July except as listed below. Such persons further advise that, for the period therein covered by this report, notebook records, if any, kept in the course of their work have been examined for possible inventions or discoveries.

Inventor (s)

Title

None

D. W. Greager
Manager, Research and Engineering
IRRADIATION PROCESSING DEPARTMENT

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PRODUCTION AND REACTOR OPERATIONS SUMMARY

JULY, 1957

Input production (Pu) for July was 99.3 percent of forecast and output production was 123.5 percent of forecast. Output forecast was exceeded due largely to discharges during unscheduled outages late in the month.

The maximum established power level (combined maximum levels for all reactors during any one day) was increased 944 megawatts above the previous high established during January, 1957. Maximum levels at individual reactors were increased 135 megawatts at KW, 65 at F, 30 at D, 25 at H and 5 at DR. The increase at KW was due to higher tube power limits resulting from increased water flow; the increases at other reactors resulted largely from increased cooling water following the installation of Project CG-558 facilities.

Sixty-two reactor outages, of which 35 were scrams, resulted in an overall time operated efficiency of 74.5 percent, including a ten-day Project CG-651 outage at C Reactor. Forecast was 78 percent.

Twelve ruptures, nine regular metal and three production test, were removed from the reactors during July. Four of the regular metal ruptures were at DR, two each at C and KE and one at B. Two production test ruptures (solid E) were at C and one (Ni-Al alloy can) was at D. None of the ruptures could be removed by the "quickie" method.

Process tubes were replaced at B, D and H Reactors during the month. Twenty-nine were installed at B, 7 at D and 60 at H.

Significant items of equipment experience were: (1) C Reactor was shut down ten days starting July 7 for Project CG-651 "Continuous Charge-Discharge - Demonstration Unit." (2) Two junctions in the DR Reactor far-side effluent line were found to be improperly welded together. The resulting water leakage from this location is believed to have been the primary cause of DR ground settling. (3) Seven process tube water leaks were located and corrected during July. Three of these leaks were caused by ruptures at DR, one was a tube leak at F and three were Van Stone: leaks (one each at C, D and F). (4) Continuous six-pump coolant water flow was begun at KW Reactor and flow was increased to 165,000 GPM. (5) 3X system balls were dropped from 49 hoppers at KW when a soft-solder fitting in the C Riser sensing line failed. (6) Graphite distortion in the top, far corner of F Reactor necessitated the charging of nine tubes with altered charges. During July all tubes charged at F below row 36 were charged in accordance with PT-IP-98I "Revised Tube Charge Pattern for Graphite Annealing."

There were no disabling injuries or security violations during July. One technical radiation over-exposure occurred.

Statistics for the Processing, Power and Radiation Monitoring Operations in the individual reactor areas are tabulated on pages Ch-1 through Ch-6 of this report.

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B-C REACTOR OPERATION

JULY, 1957

I. Organization and Functions

No change

II. Personnel

	June 30			July 31			Net Change
	<u>E</u>	<u>NE</u>	<u>TOTAL</u>	<u>E</u>	<u>NE</u>	<u>TOTAL</u>	<u>Of Total</u>
General	1	1	2	1	1	2	0
P.A. & P.D. Operation	3	2	5	3	2	5	0
B Processing Oper.	9	35	44	10	35	45	/1
C Processing Oper.	8	31	39	8	31	39	0
Power Operation	14	103	117	14	106	120	/3
Rad. Monitoring	7	21	28	7	21	28	0
Maintenance Oper.	<u>22</u>	<u>113</u>	<u>135</u>	<u>22</u>	<u>113</u>	<u>135</u>	<u>0</u>
Total	64	306	370	65	309	374	/4

J. N. Charlton, Supervisor 100 Operations II, Extra Coverage, was transferred from H Processing Operation to B Processing Operation.

Nonexempt changes consisted of two transfers out, six terminations (one R.O.F., one resignation, one retirement, two illness deactivations, one 90 day leave of absence), ten transfers in, and one new hire.

III. Personnel Activities

B-C Reactor Operation was host for 20 of the 90 HAPO Tech Grads, on July 18. The program included an introductory and orientation talk by A. R. Maguire and tours of the reactor, water and steam buildings.

Ten B-C employees attended Exempt Personnel Training Program classes during the month.

IV. Safety and Security

There were 23 Medical Treatment and no disabling injuries reported during July. No security violations were incurred.

A fire occurred in the Metal Examination Facility in the 105-B Building storage area. A rag soaked in acetone was thrown into a can that had contained chromic acid. The resultant fire was put out by turning on the safety shower. No damage or contamination resulted. Corrective action was taken to prevent a similar occurrence.

V. Non-Routine Reports Issued

HW-51038 - Irradiation Processing Department, Radiation Occurrence, Investigation Report.

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Cb-1

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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.

VII. Component ActivitiesB-C ADMINISTRATION AND PERSONNEL DEVELOPMENT OPERATIONA. Administrative Activities

The Civil Defense Evacuation practice held on July 12 was carried out with 188 people evacuated internally and 27 evacuated to the staging area. A written critique was sent to participating organizations requesting corrective action where needed.

B. Personnel Development

Four classes of the fifth series in Manager Development were conducted by C. G. Lewis during the month. The current series on "History and Organization of the General Electric Company", was attended by 36 exempt B-C personnel.

Information literature concerning the relationship between communications and decision-making by executives was issued for the B-C Manager Development Source Book.

C. Cost Control Activities

A Quarterly Savings and Improvement Report, showing an annual savings of approximately \$36,400, was issued for the fourth quarter of FY-1957.

D. Landlord Activities

Repainting of the exterior trim on essentially all 100-B Area Buildings listed on the painting schedule for 1957, was authorized and started this month.

B PROCESSING OPERATIONA. Production

Input production (Pu) for July was 87.6 percent of forecast due primarily to 15 unscheduled outages resulting from panellit scrams, VSR difficulties and a ruptured slug. Operating levels were limited by bulk outlet water temperatures, non-equilibrium operating conditions and, near month-end,

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temperature limits on PT-IP-43-A-84 MT (Evaluation of the Uniform Corrosion Resistance of M-388 Alloy Slug Jackets).

B. Operating Experience

1. Operating Continuity

There were 15 unscheduled outages and one scheduled outage in July, as follows:

<u>Date</u>	<u>Cause</u>	<u>Outage Hours</u>
7-1-57	**Scheduled Tube Replacement Outage	101.9
7-5-57	Panellit Scram - Row 24 (loose jumper)*	1.2
7-10-57	Panellit Scram - Row 08 (cause undetermined)	.4
7-10-57	Panellit Scram - Row 08 (loose electrical connections)*	.3
7-10-57	Lack of Reactivity caused by previous scrams.	30.1
7-11-57	Panellit Scram - Row 05 (cause undetermined)	1.3
7-12-57	Panellit Scram - Row 08 (possible leaking gage)	1.3
7-12-57	Panellit Scram - Row 35 (cause undetermined)	.3
7-14-57	Ruptured Slug in Tube 1868.	32.4
7-19-57	Rupture Investigation (no rupture found)	.5
7-21-57	Scram - Safety Circuit (fuse failure)	.2
7-21-57	Scram - VSR #15 dropped.	.1
7-21-57	Scram - VSR #31 dropped.	.1
7-21-57	Scram - VSR #31 dropped.	29.1
7-26-57	Panellit Scram - Gage 1088 Failure (Bourdon tube)	.4
7-29-57	Panellit Scram - Gage 3570 Failure (Bourdon tube)	.3
Total Outage Hours		199.9

**Outage initiated on June 30. Total outage hours was 111.9, of which 101.9 were in July.

*Possible causes.

The reactor was shut down at 9:47 a.m., July 10, 1957, due to lack of reactivity caused by the previous scrams. Charge-discharge was done and extensive checks were made of the Panellit system to determine scram causes. Operation was resumed at 3:51 p.m. on July 11, 1957, after 30.1 hours down.

The reactor was shut down at 10:49 p.m. on July 14, 1957, to remove a ruptured slug from tube 1868. The "quickie" attempt was unsuccessful due to an excessive radiation exposure rate on the rear pigtail. The rupture was removed and the channel left empty. Operation was resumed after 32.4 hours at 7:10 a.m., July 16, 1957.

2. Equipment Experience

VSR's Nos. 15 and 31 dropped into the reactor during operation, resulting in a series of scrams. Investigation revealed some voltage irregularities. Adjustment was made to correct the condition but

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further investigation is planned during the next outage. VSR's 10 and 27 gave trouble on shutdown and startup because of sticking. Both were cleaned and lubricated. The seal on No. 27, was removed and replaced. At month-end all VSR's were in satisfactory operating condition.

The graphite stringer in channel 2662, which failed shortly after installation last month, was removed and replaced with a new stringer. When the couples on this new stringer were tested in preparation for hook-up, it was found that a considerable number of the couples were dead. The cause of these failures is being investigated and further installations are being held up until the problem is more fully evaluated.

A rear pigtail was observed leaking on the rear face. It was removed and sent to Hanford Laboratories for analysis, and the cause of the leak was tentatively determined to be stress corrosion, possibly aggravated by vibration and decontaminates. Other pigtails are to be removed during the August 4, 1957 outage for similar analysis to determine the magnitude of the problem.

Twenty-nine tubes were replaced during the month. Fifty-eight were probologged.

The Panellit Board was the cause of eight scrams during the month. Although no specific major factor could be determined as the cause of the majority of the scrams, no further incidents of this type occurred the remainder of the month following tightening of banana plug connector retaining nuts and other electrical connectors found to be loose during the numerous inspections and checks made on the Board. A meeting of all groups engaged in the B Reactor Panellit System study was scheduled for August 1 to intensify efforts for solutions to the Panellit Board problems.

3. Other

The replacement of the new type nozzle on the poison column control facility with the old type was completed on all active tubes. The poison column control facility charge machine became stuck on Tube 1181 during operation of the system and was released with some difficulty; a dummy had become jammed in the front nozzle. The rear ball valve on 3675 became jammed open; it was left empty and in the open position. New non-magnetic interlock plugs were installed on the front face of the ball valve tubes; this permits normal operation of the system.

C. Improvement Experience

Projects active at B Reactor in July were: CG-558, "Reactor Plant Modifications for Increased Production"; CG-666, "Zone Temperature Monitoring"; CG-669, "Water and Gas Leak Locating Equipment"; CG-665, "Metal Loading Facilities"; CG-667, "Improved Space Utilization"; CG-583, "Moisture Monitoring System for Detection of Leaking Process Tubes"; CG-684, "Adequate Fresh Air Systems".

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DECLASSIFIED**D. Events Influencing Costs****1. Overtime Usage**

A total of 24 exempt and 340 nonexempt overtime hours was required at B Reactor in July.

2. Gas Usage

Although gas usage was 16 percent less than the previous month, consumption (449,865 cubic feet including 92,065 cubic feet of helium) remained high despite continued efforts to find and repair leaks.

3. Shutdowns

There were 70.6 unplanned outage hours during July. One rupture in tube 1868 accounted for 32.4 outage hours and resulted in the temporary loss of the productivity of that channel. Troubles experienced with the Panellit and the VSR system not only caused outage time but required considerable manpower. These items contributed materially to production costs.

C PROCESSING OPERATION**A. Production**

The C Reactor input production (Pu) for July was 94.8 percent of the forecast. The operating control point was tube power (average 10 hottest tubes) throughout July. The production was less than forecast as a result of nine unscheduled outages in addition to a 60-hour extension required to complete the CG-651 outage work.

B. Operating Experience**1. Operating Continuity**

Two scheduled outages and nine unscheduled outages were experienced during the month. The cause and outage time are as follows:

<u>Day</u>	<u>Cause</u>	<u>Outage Hours</u>
2	Rupture (tube 2479)	32.3
7	Scheduled - CG-651	241.5
17	Scheduled - Poison Outage	6.0
17	Neutron monitor trip - Prematurely unbypassed during check	.7
18	Rupture (tube 1464)	21.4
18	Panellit trip - adjusting crossheader gage	1.4
21	Rupture (tube 1461)	30.5
23	Panellit trip - row 43 (unexplained)	.7
24	Rupture (tube 2663)	29.7
25	Panellit trip - row 43 (oscillation #4377)	.5
25	Panellit trip - row 43 (unexplained)	.4
Total		365.1

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Two of the ruptures experienced were in tubes charged with solid E slugs in accordance with PT-IP-1A "Evaluation of I & E Slugs Operating at High Specific Powers" as run-to-rupture charges. Only one of the four ruptures (tube 1464) could not be discharged with normal charge machine force, requiring use of the hydraulic pushing machine for its removal.

2. Equipment Experience

VanStone Leak

Following the startup from the CG-651 outage, an increase in condensate collection indicated that a water leak had developed during the outage. A check of the rear face ball valves disclosed that the ball valve adaptor on tube 2668 was loose, permitting the rear VanStone joint to leak. The leak was corrected.

Crossheader Screens

Twenty-five front face crossheader screens were cleaned as a result of plugging indications. The degree of plugging ranged from very slight to 5 percent plugged; however, no crossheader screen was plugged enough to create a dangerous flow restriction.

Process Tube VanStone Flange

During installation of the front face and rear face ball valves a split VanStone was detected on three tubes. New VanStones were successfully rolled on the tubes, thus eliminating the need for replacing the process tubes.

C. Improvement Experience

1. Production Tests

PT-IP-19-A - Pilot Charging of I & E Fuel Elements - C Reactor

A total of 42 tubes was charged with I & E slugs and 37 tubes containing I & E slugs were discharged. At month's end there was a total of 400 tubes charged with regular I & E slugs. A total of 1256 overbored nozzles are installed on the reactor.

PT-IP-30-A - Determination of Optimum Cored Hole Size - One tube charged in accordance with this production test was discharged during the month, terminating the test.

PT-IP-43A-84MT - Evaluation of the Uniform Corrosion Resistance of M-388 Alloy Slug Jackets - One tube charged with this production test was discharged during the month. Eleven tubes with this production test remained in the reactor at month-end.

PT-IP-1A - Evaluation of I & E Slugs Operating at High Specific Powers - Two tubes charged with solid E slugs were discharged during the month as a result of a ruptured slug in each tube. Both tubes were operating on a run-to-rupture basis. A total of three tubes charged with enriched I & E slugs in accordance with this production test are in the reactor at month end.

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2. Projects

Projects active during the month were: CG-651, "Continuous Charge-Discharge Equipment - C Pile - Demonstration Unit"; CG-579, "Effluent Water Monitoring Improvements - 100 C Area" (completed); CG-600, "100-C Alterations"; CG-669, "Water and Gas Leak Locating Equipment"; CG-666, "Zone Temperature Monitoring"; C-431, "105-C Completion" (horizontal rod replacement); and Development Test-R-84506, "Metal Sheathed Thermocouples".

3. Other

Rear Nozzle Inserts - Design Change - 170-C

The cutting of 1-1/4" off the upstream end of the rear nozzle insert as authorized by Design Change 170-C was continued throughout the month.

Stainless Steel U-Pin Installation

Stainless steel U-pins to affix the front nozzle inserts to the nozzle caps were installed on all front face nozzles. The stainless steel U-pins replaced the existing aluminum U-pins. The failure of the aluminum U-pins, in two instances, had resulted in two unscheduled outages in the past.

D. Events Influencing Cost

1. Overtime

A total of 130.6 man-hours overtime was required during the month.

B-C POWER OPERATION

A. Operating Experience

Line No. 3 to the river pump house failed on July 3, 1957, due to arcing of the pole disconnect switch. The incident caused no unusual problems as both B and C Reactors were down. Contacts and springs were replaced and the line restored to service.

Six-pump operation at 190-B Annex was required from 5:00 a.m. until 6:15 a.m. on July 5, 1957 while a broken nipple was being replaced on No. 7-A by-pass header.

The use of Separan in water treatment was not required after July 17, 1957, due to lowered turbidity of the river water.

Due to extremely high filter rates required to supply post CG-558 process water demand there has been higher-than-normal loss of Anthrafilt filter media. Studies were started to determine means of controlling this loss and to increase filter efficiency. Filter sand was ordered to add three more inches of sand to each filter, in an effort to improve filter efficiency.

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Ten-pump operation in 190-C was discontinued on July 29, 1957 due to the necessity of removing No. 12 pump from service for Vendor and Project Construction inspection.

B. Equipment Experience

1. 181-B Building - No. 12-B pump was still out of service for repairs to be done by Minor Construction forces. The work was held up due to labor difficulties. No. 13-B and 15-B repairs were held up for the same reason.
2. 190-C Building - No. 5 unit was shut down on July 7, 1957 when an unusual noise developed in the outboard flywheel bearing. Both flywheel bearings were found to be worn and were replaced. The oil pump bearings were also replaced. The unit was returned to service on July 16, 1957.
3. 190-B Annex - No. 2-A cone valve failed to close properly while reducing pressure on July 14, 1957. Investigation shows this to be a binding effect in the seating mechanism which will be corrected when this unit can be removed from service on August 5, 1957.

C. Improvement Experience

1. Projects

CG-558 -Modification of the by-pass on 5-A unit in 190-B Annex was completed except for hydrostatic test and installation of the cooling water line which had been removed during modification.

D. Events Influencing Costs

1. Chemical costs were reduced due to a decrease in raw water turbidity and discontinuing the use of the filter aid, Separan.
2. The total overtime hours worked by B-C Power employees for July was 83.1 hours.

B-C RADIATION MONITORING OPERATION

A. Radiation Occurrences

During removal of the horizontal control rods by Minor Construction forces at 105-C, the area near the rod rack and the thimble cave was contaminated from residual rod water. The ground at the east end of the thimble cave was contaminated up to 8 rads/hr. The maximum activity reported in the vicinity of the rod rack was 1.2 rads/hr on the roadway north of the rack enclosure. Decontamination of the areas involved was initiated by Minor Construction forces.

There was no Lapse of Radiation Control during the month, chargeable to B-C Reactor Operation.

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Personnel dose rates up to 2 r/hr were experienced in an attempt to effect a "quickie" discharge of a ruptured fuel element at B Reactor.

Personnel dose rates, for Project CG-651 ball valve installation in the C Reactor discharge area, was 100 mr/hr. Job progress after five days resulted in personnel dose rate reduction to 50 mr/hr.

Ball valves in the 105-C Ball 3-X tunnel were manipulated with a maximum personnel dose rate of 3 r/hr.

An attempt to remove a thermocouple graphite stringer at the front face of the B Reactor occasioned personnel dose rates up to 3 r/hr.

The maximum dose rate observed in the 105-C Building during horizontal control rod removal was 1 r/hr in the lunch room. The dose rate at the 105-C Badge House was 70 mr/hr. There were no uncontrolled doses to IPD personnel.

Radiation surveys following the addition of shielding material to the floor of the outer rod room in 105-B indicate a maximum dose rate of 2.8 mr/hr at the ceiling of the air conditioning room and 2.4 mr/hr at the ceiling of the Processing Operation supervisor office. This compares to a maximum level of 38 mr/hr prior to shield addition.

C. Contamination Control

There were six instances of skin contamination, all were decontaminated; none constituted an exposure problem.

Of 125 vehicles surveyed, two were found to be contaminated. Both were easily cleaned. This reflects a drop in frequency of contaminated vehicles from 12% in June to less than 2% this month.

There were six cases of personal clothing contamination with a maximum activity of 3,000 c/m. All were decontaminated.

A total of 146 air samples were taken, none indicated activity densities greater than permissible limits for respiratory protection worn.

Dose rates up to 100 mrad/hr were encountered at the doors to the 105-C storage area due to emission of radio-active gas from a discharged ruptured fuel element.

Free radio-active gas on the front face of the C Reactor caused dose rates of 40 mrad/hr in the corridor adjacent to the monitor room, 125 mrad/hr at the work area entrance and greater than 3 rads/hr on the charge face.

D. Events Influencing Costs

A total of 448 overtime hours were worked by the Operation in July.

B-C MAINTENANCE OPERATION

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A. Equipment Experience

1. Instruments

Power Calculator System - 105-C - Three thermo-wells were removed from the B-2 riser and acid-cleaned. This relieved the erratic calculator readings being experienced.

Beckman Interlock - 105-C - The safety circuit interlock on the #1-3-4 Beckmans was completed and placed in operation. All excess cable, switches, and terminal boards were removed from the four control room Beckmans to eliminate confusion and the possibility of scrams.

2. Electrical

Ball 3-X System - 105-B - All terminal blocks on top of the units were replaced. This change should help alleviate loose connections resulting from vibration conditions prevalent in the 105-B Building.

AC Supply to Panellit System - 105-B - During a complete check of all circuits within the Panellit system, two loose connections were found in the safety circuit wiring and AC supply to the Panellits. Although this may not have been the primary reason for the numerous Panellit scrams, it could have been a contributing factor.

Design Changes - 105-C - During the CG-651 outage at 105-C, design changes 126, 132, and 137 were completed. Design Change 126 eliminated the individual time delays to the VSRs. Design Change 132 involved ungrounding of the Panellit system and provided a ground detector system. Extensive wiring of the row relay circuits was required in conjunction with this work. Design Change 137 incorporated a complete replacement of safety circuit relays, simplification of circuitry, replacement of below-standard time delay relays in the VSR clutch circuits and installation of a Beckman lock out system.

Standby Instrument Supply Transformers - 105-C - The 3-phase standby instrument supply transformer was replaced with three single-phase variable voltage 5 KVA transformers. The original transformer did not maintain the required voltage during pump start-ups at 190-B Annex.

3. Mechanical

Gas Line Drip Legs - 105-C - Drip leg piping was altered to permit installation of the transmitters in the inner instrument room in place of the former tunnel location. This eliminates the necessity of entering the tunnel to service the transmitters.

Groves Valves - 105-C - Necessary piping alterations to permit testing of the high tank groves valves during reactor operation was completed during the CG-651 outage.

Tube Removal - 105-B - During the week of July 1, 29 tubes were removed and replaced at 1.12 hours per tube and 179 mr per tube.

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DECLASSIFIED**B. Shift Maintenance Activities**

Shift Maintenance personnel were engaged in the following work during July:

1. Tube removal outage at 105-B.
2. CG-651 (Continuous Charge-Discharge) installation at 105-C.
3. Tube removal and tube handling facilities installation at 105-H.
4. Tube removal at 105-DR.
5. Productive Maintenance and emergency coverage in 100-B Area.

C. Maintenance Engineering and Planning and Scheduling**1. Instrument Engineering**

Graphite Stringer Thermocouple - 105-B - Immediately after start-up, all of the thermocouples in a newly installed stringer in Channel 2662-B failed. A portion of this stringer was removed and inspected to determine the location and cause of failure. The point of failure was about 10-1/2 feet from the front face flange, directly ahead of the first thermocouple bearing graphite block. All of the insulation on the wires that had been exposed to the high temperature of the graphite was charred and flaking off. The cause of failure was the result of one of the graphite blocks rotating 180 degrees, flaking off the insulation and shorting all of the wires together. Studies were started of different types of insulation for use in a graphite stringer and a keying arrangement for the graphite pieces to prevent rotation.

B Reactor Oxygen Analysis Equipment - The appropriation request for the purchase of the Beckman oxygen analysis equipment was approved. A purchase specification was prepared to provide the information necessary to order this equipment.

C Reactor Thermocouple Assemblies - A new type of thermocouple assembly, designed to reduce the maintenance time required to repair and replace thermocouple assemblies, was successfully tested on the reactor. A Design Change (No. 12-C), authorizing the installation of the new assembly was prepared and circulated for the necessary approvals.

C Reactor Twenty-Tube Average Temperature Difference Recorder - Specifications and other necessary information have been prepared in order that inquiries to vendors could be made pertaining to the purchase of the equipment necessary to record the temperature and the difference between the average of 20 outlet thermocouples and one inlet thermocouple.

2. Mechanical Engineering

105-B Ball 3X Study - Past use of the B Reactor ball recovery system indicates that it is inadequate for the purpose. A study is being conducted to establish the deficiencies of the system and to determine necessary remedial action. This work is being coordinated with similar efforts in other areas.

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107-C Basin - Engineering assistance was provided to determine the extent of the repairs necessary to return the East 107-C retention basin to a usable condition. Recommendations for repairs to the basin and other portions of the effluent system are being prepared.

C Reactor Rear Nozzle Connectors - A design change which authorizes the installation of "O" ring type connectors is circulating for approvals. Vendor bids indicate that these assemblies can be procured for about the same cost as the present "question mark" type connector.

3. Electrical Engineering

Design Change 137-C - Safety Circuit Revisions - Engineering assistance was provided during the safety circuit revision at C Reactor during the CG-651 outage. An acceptance test procedure was prepared and conducted on completion of the circuit changes. Three new safety circuit prints were as-built and have been forwarded to the Drafting Operation to be redrawn. Six pages of the 105-C Electrical Manual were as-built and reissued.

4. Planning and Scheduling

During July, 6,702 man-hours of labor were scheduled for Productive Maintenance. This included 3,211 man-hours for the July schedule, 3,323 man-hours carryover from previous months and 168 man-hours requiring addition during the month. Of the total scheduled Productive Maintenance work, 54.3% was completed.

D. Events Influencing Costs

Overtime Usage

Maintenance overtime requirements for B-C Reactor Operation totaled 1143.8 hours.

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A. R. Maguire

Manager
B-C REACTOR OPERATION

AR Maguire:GSS:mus

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D-DR REACTOR OPERATION
JULY 1957

I. ORGANIZATION AND FUNCTIONS

There were no changes in the assigned responsibilities during July. The title of the Administration and Personnel Development Operation was changed to "Plant Administration Operation" with no change in assigned responsibility.

II. PERSONNEL

A. <u>Force Summary</u>	<u>June 30</u>			<u>July 31</u>			<u>Net Change of Total</u>
	<u>E</u>	<u>NE</u>	<u>Total</u>	<u>E</u>	<u>NE</u>	<u>Total</u>	
General	1	1	2	1	1	2	0
Plant Administration	3	2	5	3	2	5	0
D Processing	8	36	44	8	36	44	0
DR Processing	7	30	37	7	30	37	0
D-DR Power	14	110	124	14	112	126	+2
D-DR Rad. Mon.	5	21	26	5	21	26	0
D-DR Maintenance	<u>23</u>	<u>137</u>	<u>160</u>	<u>23</u>	<u>137</u>	<u>160</u>	<u>0</u>
TOTAL	61	337	398	61	339	400	+2

B. Movement of People

G. R. Klingler was promoted from Junior Engineering to Maintenance Engineer II during July. P. C. Althoff was promoted from Maintenance Engineer II to Maintenance Engineer I during July.

Nonexempt personnel movement during July included, 1 deactivation, 11 transfers in, 6 transfers out and 2 terminations.

III. PERSONNEL ACTIVITIES

A one-day orientation program for 14 new Rotational Technical Graduates was conducted by D-DR Reactor Operation on July 18, as a part of the overall IPD and HAPO program. Assistance was given J. P. Duckworth, Specialist, Professional Personnel Development, in developing the IPD program.

IV. SAFETY AND SECURITY

D-DR Reactor Operation experienced 12 Medical Treatment Injuries and no disabling injuries during July.

No Security Violations were incurred.

V. NON-ROUTINE REPORTS

None.

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VI. INVENTIONS AND DISCOVERIES

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 advise that for the period covered by this report, notebook records, if any, kept in the course of their work have been examined for possible inventions or discoveries.

VII. COMPONENT ACTIVITIES

D-DR PLANT ADMINISTRATION OPERATION

A. Administration Activities

A review was conducted, during the month, of the office furniture needs of the D-DR Reactor Operation. The status of backlogged furniture orders was determined by an audit of the records maintained by A. C. Miller. Thirty-eight items of furniture for additions and replacements were received.

B. Personnel Development

The Section and Subsection Managers of D-DR Reactor Operation are enrolled in the current series of meetings on "Understanding People" being conducted by Dr. J. C. Conant for IPD employees.

Three rotational technical graduates were added to D-DR Reactor Operation during the month. R. F. Warnick, rotational technical graduate, accepted a permanent assignment as Supervisor-In-Training in the DR Processing Operation. Thus, the number of technical graduates assigned to D-DR Reactor Operation at month end is four.

C. Cost Control Activities

In line with the Department Cost Reduction Program, a cost reduction program for the D-DR Reactor Operation was developed and submitted during July.

D. Landlord Activities

Two meetings were held during July with representatives from Facilities Engineering, Relations and Utilities, and Legal, in laying the groundwork for removal of the unused equipment from Buildings 185-B, D and F. Also a letter requesting AEC approval to proceed with this work was submitted to the General Manager, Irradiation Processing, for signature.

In an effort to improve the appearance of the offices in 100-D Area, a drive to encourage the use of bulletin boards was launched during July. Orders have been forwarded for installation of about 30 bulletin boards.

D PROCESSING OPERATION**DECLASSIFIED**A. Production

Input production was 105.8 percent of the official forecast.
Time operated efficiency was 83.4 percent.

New record highs for daily production and maximum operating level of thirty units and twenty-seven units respectively, were attained during the month. These accomplishments were possible because of long-term metal reactivity gains resulting in improved flattening, and the tube power limit of 950 KW which was established in June.

B. Operating Experience1. Operating Continuity

<u>Date of Outage</u>	<u>Outage Hours</u>	<u>Reason</u>
7/4	36.2	Rupture in tube 3578-D. Reactor remained down for charge-discharge.
7/6	1.1	190 power failure scram caused by relay malfunction at Bldg. 190-D.
7/6	1.0	Panellit scram caused by unexplained opening of ball valve on tube 2773-D.
7/22	0.3	Panellit scram while obtaining base pressure of tube 1452-D on Heise.
7/28	73.3	Scheduled outage for tube removal and charge-discharge.
7/31	11.3	Poison discharge and repair of front Van Stone leak on tube 1051-D.

2. Equipment Experience

Ruptured Slug Data -- 3578 - Metal was lot IF-43-A, concentration 295, charged 4-29-57. The metal was discharged using jack pressures up to 5000 pounds.

Seven process tubes were replaced during the July 28 outage. During the July 28 outage, the graphite stringer was removed from Channel 3466-D and replaced with a new one.

VSR Number 27 was returned to service following successful functional tests (see D-DR Record Report for June). VSR Channels 31 and 36 were probed with an electromagnet in an effort to dislodge 3X balls from the graphite voids. Borescopic examination indicated about 60 percent recovery in the two channels. Further magnet modifications are being made to increase its efficiency. A faulty gas seal was replaced on VSR Number 30.

Rear face sample room valve packings were tightened in an effort to eliminate their closing during operation. Evidently, rear face piping vibrations have previously caused the closing of some of these valves.

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Equipment Experience - D Processing (Continued)

New level control valves were installed on both D Reactor high tanks during July. These valves will eliminate the need for frequent manual filling.

A new plastic work area curtain was installed at D Reactor during the month.

During the July 31 poison discharge outage, the inlet drip leg was found to be full of water. Investigation revealed a faulty front Van Stone on tube 1051-D. The charge in the tube had previously been broken loose with a Blackhawk jack at which time the Van Stone had been damaged. A new Van Stone was formed and the tube returned to service.

C. Improvement Experience

1. Production and Process Tests

IP-12-EA - "Poison Spline Flexible Control System"- Supplement C

One modified spline cap was installed on tube 2451-D in further development tests. The tube, containing dummies, was isolated from the Panellit system to prevent any further scrams from this test. In previous months, two scrams have resulted from these special spline caps.

IP-39-A - "Measurement of Slug Jacket Corrosions"

Two process tubes were charged for corrosion studies during the month.

IP-95-A-79MT - "Irradiation of Lead Dip Canned I and E Slugs"

Eight process tubes were charged as authorized by the above test. Four of the tubes contain I and E slugs with special temperature monitoring facilities installed. Dual Panellit protection has also been provided for these four tubes. The remaining tubes, charged with solid material, are to be utilized as control tubes.

2. Projects

a. Project 667 - "Improved Space Utilization - 105-D Building"

Building additions completed under this project were accepted during the month.

D. Events Influencing Costs

Unit cost is expected to be normal for the month. The expenses of the ruptured slug outage and tube replacement outage should be largely offset by the record high production attained during the month.

DR PROCESSING OPERATION**DECLASSIFIED**A. Production

Input production was 97.4 percent of the official forecast. Time operated efficiency was 78.2 percent. Outages caused by four ruptured slugs, three of which produced leaking tubes, were responsible for the failure to meet these goals.

New record highs for daily production and maximum operating level, of five units and six units respectively, were attained during the month. During the early part of the month, the DR Reactor operated with 1,500 effective central tubes which is believed to be a record for a nine-rod reactor.

B. Operating Experience1. Operating Continuity

<u>Date of Outage</u>	<u>Outage Hours</u>	<u>Reason</u>
7/14	87.4	Schedule outage for charge-discharge, problem tube replacement and leak testing.
7/17	0.6	The reactor was scrammed manually when first indication was reached 150 inhours before predicted.
7/17	1.1	Flux monitor scram caused by moving the wrong chamber during chamber repositioning.
7/17	13.2	Ruptured slug and associated water leak in tube 1587-DR.
7/28	31.6	Ruptured slug in tube 3285-DR.
7/30	12.8	Ruptured slug and associated water leak in tube 3572-DR.
7/31	15.7	Ruptured slug and associated water leak in tube 2380-DR.

2. Equipment ExperienceRuptured Slug Data

1587 - Metal was lot A121, concentration 136, charged 6-18-57. The ruptured slug caused a rupture of the process tube. The metal was discharged with the charging machine.

3285 - Metal was lot Z343, concentration 207, charged 6-18-57. The metal was discharged using jack pressures up to 3000 pounds.

3572 - Metal was lot A125, concentration 208, charged 6-18-57. The ruptured slug caused a rupture of the process tube. The metal was discharged with the charging machine.

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Equipment Experience - DR Processing (Continued)

2380 - Metal was lot Al25, concentration 213. charged 6-18-57. The ruptured slug caused a rupture of the process tube. The metal was discharged with the charging machine.

All four ruptures appeared as hot-spot type ruptures and a severe corrosion attack was in evidence around the rupture area indicating the possibility of poor can quality. The four failures were canned in the new Hunter-Douglas can.

An intermittent short in the trail cable for the metal loading elevator caused a five hour delay in outage work. A study is being made to determine the feasibility of relocating the trail cable.

Problem tube 1783 was removed and a new tube installed in the channel.

Two sections of the far effluent line inside the concrete anchor just outside of Building 105-DR were found to be poorly welded together. Welding of these junctions is in progress at month's end. Water leakage at this point has apparently contributed to the settling of this building.

Sensing lines were installed for indicating the pressure or vacuum at the tops of the downcomers. These will provide data for use in consideration of bulk outlet water temperature limits.

Sixty-three process tubes which were calculated to have a wall thickness of 28 mils, or less, were probologged. All were found to have greater than thirty mils tube wall remaining.

Slugs from two tubes selected at random from the June 18 discharge were inspected. A "hot spot" was found on each of two slugs from tube 1576-DR and three slugs appeared to have been "cocked" in tube 1577-DR.

C. Improvement Experience

1. Production and Process Tests

PT-105-623-A - Relation Between Hand and Flow Seating of Slug Charges as they Affect Slug Rupture Rates - All tubes charged during July 14 outage were hand seated.

PT-IP-529-SI - The Routine Exposure of Special Irradiations Samples Charged and discharged five HAPO 184 samples during the month.

PT-IP-67-D - Irradiation of Zirconium-Uranium Alloy Test Specimens Charged one tube and discharged two tubes during the July 14 outage.

PT-105-534-SI - Irradiation of NAA Pile Safety Device - Discharged one NAA sample completing this production test.

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Production and Process Tests (Continued)

PT-IP-77-D - The Irradiation of Special Request WAPD 114-A -
Charged two tubes during the July 14 outage.

PT-IP-59-A In-Reactor Corrosion of Fuel Elements Autoclaved
in 1% Chromic Acid - Charged ten tubes during the July 14 outage.

PT-IP-39-A - Measurement of Slug Corrosion - Charged two tubes
during the July 14 outage.

2. Projects

CG-665 - Metal Loading Facility - Inspection by a factory repre-
sentative will be made in the near future to determine the
reason for overheating of the drive motor.

CG-583 - Moisture Monitoring System - A total of 93 dewcells
have failed due to excessive moisture in the cell. The feasibility
of repairing the cells locally is being investigated at month end.

3. Other

The discharge of metal from the DR Reactor during the July 14
outage was accomplished by flushing. Metal was then charged
while maintenance activities were in progress in the discharge
area. An estimated twelve hours of outage time were saved by
using this method.

Tipoffs were not used at the DR Reactor during the month for
discharging metal either by flushing or with the charging machine.
Considerable exposure to radiation is prevented by eliminating
this step in the discharge procedure.

D. Events Influencing Costs

Due to the expense associated with four ruptured slug outages, the
July unit cost is expected to be higher than that for June.

D-DR POWER OPERATION

A. Operating Experience

Normal process water flow and pressure was maintained approximately
84.1 percent of the time to D Reactor and approximately 79.7 percent
of the time to DR Reactor.

Boiler operation was satisfactory during July, with an average steam
load of 85,000 lbs./hr. and a maximum load of 134,000 lbs/hr. The
average evaporation rate was 6.43 lbs. of steam per pound of coal,
with an average efficiency of 64.3 percent.

A survey to determine the amount of anthraflit required for replacement
in the D and DR Water Plant filters was completed during the month.

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DECLASSIFIED**B. Equipment Experience**

Work continued on replacement of the wooden simplex vent houses on the export lines.

Replacement of several deteriorated wooden handrails and steps, with steel ones, has been completed at Buildings 181-D and 183-D.

A two-inch leaking downcomer tube was removed and blanked off in the Building 184-D Number 3 boiler early in the month (see D-DR Record Report for June). Later, the boiler was again removed from service for third party and Class "A" inspections. Subsequent repair work has been initiated on this unit.

When attempting to start the Building 190-D Number 2 pump unit while raising water pressure on July 5, the Number 26 relay cleared the unit in approximately 46 seconds causing the turbine trip circuit to function. This condition was repeated while raising water pressure on July 6, which resulted in a scram of D Reactor. Investigation disclosed a bad contact in the Number 26 relay and several loose connections in the Number 53 relay. Those items were corrected and the pump returned to service.

The Building 190-D Number 3 pump unit was started on July 16 for flushing the discharge header. After five minutes of operation, it was necessary to shut the unit down because of heating of the outboard carbon seal. The unit stopped turning in four minutes instead of the usual sixteen minutes. Upon removal of the top casing, the outboard wearing ring was found to be rubbing the secondary impeller due to improper clearance. The wearing rings on this pump were then replaced with modified rings.

On the Building 190-DR Number 6 pump unit, the primary impeller wearing rings were replaced with modified rings during July.

Level control valves were installed on the D Reactor high tanks during July.

C. Improvement Experience

Project CG-714 - The replacement of 99 steam line poles was started by the Hughes Construction Company of Kennewick, Washington.

D. Events Influencing Costs

July maintenance costs were high due to a heavy schedule of productive maintenance work.

D-DR RADIATION MONITORING OPERATION**A. Radiation Occurrences**

An uncanned ruptured fuel element was inadvertently shipped to the 300 Area Radiometallurgy Lab from Building 105-D. Gross contamination

DECLASSIFIEDRadiation Occurrences (Continued)

spread occurred at the Radiometallurgy facility when the shipping cask was unloaded. This occurrence was formally investigated and reported in document HW-51709.

Contamination up to 200 mrad/hr at surface was found on the D Reactor "Fly's Eye" room floor. The source of this contamination was identified as water which had leaked around the shielding plug through the wall and had come from a leaking rear ball valve.

During an outage at the DR Reactor a steam jet siphon was used to control the storage basin water level and was accidentally left in operation after startup. When this condition was discovered the basin water level had been lowered about 12 feet below normal. Dose rates over the pickup chutes had increased to 60 mr/hr. This occurrence was formally investigated and reported in document HW-51737.

Two other lapses of radiation control occurred at the DR Reactor: one in which an employee received 7 mrad/hr exposure from a radioactive particle on his undershirt, and another in which a timekeeping error resulted in two maintenance employees each receiving 12 mr more exposure than planned.

B. External Exposure Control

A complete survey was made to determine post CG-558 dose rate increases at D Reactor -9' levels. The maximum dose rate found in front of the channels was 83 mrem/hr as compared to a previous maximum dose rate at the same location of 50 mrem/hr.

During the month, additional floor shielding was installed in the D Reactor outer rod room. This action was necessary as dose rates up to 4 mr/hr had been experienced in the control room as a result of rod movements.

C. Contamination Experience

Radioactive specks having maximum dose rates of 5 rads/hr were found on the D washpad floor in the vicinity of the cooker tanks. The specks were easily removed and no external exposure received from them.

Following the discharge of metal by water flushing at the DR Reactor spotty amounts of contamination were found on the discharge area rear wall giving dose rates up to 16 rads/hr including 500 mr/hr.

D. Events Influencing Costs

There was no significant cost change during the month.

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D-DR MAINTENANCE OPERATION**DECLASSIFIED**A. Equipment Experience1. Instruments

<u>Panellit Data for July</u>	<u>105-D</u>	<u>105-DR</u>
Base Checks	2	2
Gauges adjusted during operation	800	1,477
Defective switches	2	1
Capillary Tube failure	0	2
Bourdon tube leak	1	1
Stripped adjusting gear	0	0
Sticky dial drum bearing	0	1

At DR Reactor six defective rear face thermocouples were replaced during the month.

Four new Mark II Chambers have been installed under the DR Reactor for service with the Control Room, Flux monitoring Beckmans. These chambers were used to replace the G. E. chambers, which were previously used, as they have a greater relative sensitivity to neutron flux.

2. Electrical

On several occasions, recently, the D Reactor C and D Elevators have become inoperative because of faulty electrical equipment. In an effort to eliminate this problem a complete replacement set of over-load relays for these systems has been ordered.

3. Mechanical

Repairs made during July to the Building 184-D Number 3 boiler include: replacement of all header gaskets, repacking of all valves, repair of brick work on the fire wall, plastering of the ash hoppers for water proofing, stoker repairs, and rebricking of the top four courses of Number 4 hopper.

The new instrument shop in Building 105-D was occupied during the month.

B. Maintenance Shift Activities

During July the D-DR Maintenance Shift Crews spent 68 percent of their time within the Area and 32 percent of their time in other areas.

C. Maintenance Engineering and Planning and Scheduling1. Instrument Engineering

Engineering was completed for installation of level control valves on the D Reactor high tanks. The valves were installed and tested satisfactorily during July.

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Instrument Engineering (Continued)

A report has been issued covering the results of leak testing performed on the D Reactor gas system during the recent outage for recovery from a 3X ball drop. This affords the devising of a more organized approach for reducing the D Reactor gas loss.

Thermocouple wire used currently in graphite stringers has a life expectancy of approximately six months. The Material Development Operation will work in conjunction with Maintenance Engineering on a program initiated to develop an improved material for this purpose.

2. Electrical Engineering

A study has been initiated to determine the extent to which heating currents may cause excessive magnetic forces which could be a factor influencing design of proposed test specimens. A search of the literature and most of the calculations to determine excessive forces has been made.

3. Mechanical Engineering

For pumping soluble oil to the charging machine, a centrifugal pump driven by a two h.p. motor was installed in the DR stack gas sampling shack and tested. It was found that the motor was overloaded due to pumping the high viscosity UCON oil. Revisions to the system to correct this problem included moving the pumps and storage tank down to the -9' level and replacing the centrifugal pump and motor with a gear pump and 3/4 h.p. motor. The new system was tested and accepted during July.

The diameter of the original FCC charger plunger heads was small enough to allow the heads to jam inside thin wall dummies. A larger head has been designed and tested satisfactorily at D Reactor.

4. Planning and Scheduling

During the month a system of daily meetings for Mechanical and Transportation Supervisors was established. The purpose of the meetings is to formulate and coordinate the work schedule for the following day. All customer groups are invited to send representatives in order to be acquainted with the work schedule and to establish desired priorities.

D. Events Influencing Costs

Maintenance overtime costs for July will be very low as overtime used was only approximately 22 percent of that forecasted. The Work Sampling program initiated in June was completed during July. It is anticipated that information developed as a result of this study, will contribute to increased efficiency of the maintenance work forces.

E. W. O'Rourke

Manager,
D & DR REACTOR OPERATION

EW O'Rourke:WLS:af

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F REACTOR OPERATION
JULY - 1957

DECLASSIFIED

I. ORGANIZATION AND FUNCTIONS

No change.

II. PERSONNEL

A. Force Report

	<u>June 30</u>			<u>July 31</u>			<u>Net Change</u>
	<u>E</u>	<u>NE</u>	<u>Total</u>	<u>E</u>	<u>NE</u>	<u>Total</u>	<u>of Total</u>
General:	1	1	2	1	1	2	0
Plant Administration:	3	1	4	3	1	4	0
Processing:	7	35	42	8	35	43	+1
Power:	8	67	75	8	64	72	-3
Radiation Monitoring:	4	12	16	4	11	15	-1
Maintenance:	<u>16</u>	<u>93</u>	<u>109</u>	<u>16</u>	<u>93</u>	<u>109</u>	<u>0</u>
Total:	39	209	248	40	205	245	-3

B. Movement of People

R. H. Nelson transferred from Supplemental Crews Operation to F Processing Operation as Supervisor - Supplemental Coverage, effective July 1.

III. PERSONNEL ACTIVITIES

Sixteen craft personnel from F Maintenance Operation attended a training session conducted by Standards Engineering Operation on the operation and maintenance of Fisher Governor Controls.

R. C. Christianson, Operations Analyst, presented a discussion on "Current Operating Conditions at F Reactor", at a technical information meeting of the Plant and Industrial Engineering Operation.

One man on the A.E.C. Fellowship Program received four days' on-the-job training from F Radiation Monitoring personnel.

Radiation Monitoring Operation personnel conducted information meetings on Radiation Protection for F Maintenance Operation personnel.

Three Conference Table Meetings were conducted by C. N. Gross, with 31 nonexempt personnel attending.

Productive Maintenance information meetings were attended by eight F Reactor Operation personnel.

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DECLASSIFIEDPERSONNEL ACTIVITIES (Continued)

S. F. Ginther, Power Supervisor, attended an information meeting on the Salary Plan Administration.

IV. SAFETY AND SECURITY

Fifteen medical treatment cases were reported during July. There were no disabling injuries and no security violations reported.

V. NONROUTINE REPORTS ISSUED

None.

VI. INVENTIONS AND DISCOVERIES

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.

VII. COMPONENT ACTIVITIESF PLANT ADMINISTRATION OPERATIONA. Administration Activities

The Linedex personnel and functional directory for F Reactor Operation personnel was revised and issued.

Arrangements were made in cooperation with Security and Safety for recognition and publicity of the attainment on July 27 of eight years of operation without a disabling injury at F Area.

B. Personnel Development

A one-day orientation program and area tour was conducted for 15 new Rotational Technical Graduates on July 18, with E. W. Wilson as Tour Leader.

Two Technical Graduates are presently assigned to F Reactor Operation on a rotation training basis.

C. Cost Control Activities

Assistance was given to the Level 4 components in preparation of a cost reduction program by component. The cost reduction program for F Reactor Operation was prepared and submitted.

DECLASSIFIED**D. Landlord Activities**

A survey of office space utilization in Building 1704-F was made and work initiated for rearrangement of offices to provide improved working conditions for office personnel.

Space occupancy rates were reviewed and rental rates established for FY-1958 and submitted to Financial Operation. Landlord property records were revised to include building changes and additions resulting from Project CG-558 and the 105-F space utilization project.

F PROCESSING OPERATION**A. Production**

F Reactor production was 130.3 percent of forecast during July. Time-Operated-Efficiency was 90.5 percent. Previous maximums in level and daily input production were increased by 65 units and 53 units, respectively, during the month. Production was above forecast due to greater than forecast efficiency and improved flattening plus the fact that a three-day tube outage forecast for July was indefinitely postponed. Levels were restricted by nominal 900 kw/tube limits until late in the month when limits were increased to nominal 930 kw/tube limits.

B. Operating Experience**1. Operating Continuity**

<u>Outage Date</u>	<u>Outage Hours</u>	<u>Reason</u>
7-16-57	66.9	Scheduled charge-discharge and leak testing.
7-19-57	3.6	Insufficient rod for turnaround.
7-23-57	0.3	Panel lit scram due to leaking Bourdon tube.
Total:	70.8	

2. Equipment Experience

Leak Testing - The reactor was stinger leak tested below Row 15 during the July 16 outage. A rear Van Stone leak was found on No. 0678-F and a tube leak on No. 0184-F. Both tubes were discharged and isolated for replacement at a later date. Since the outage, water collection rates have averaged approximately 12 gallons per day.

Graphite Distortion - Distortion in the top, far corner of the reactor necessitated probing in the affected region prior to charging. Nine tubes required altered charges, based on probe

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Graphite Distortion (Continued) - data. One charge in No. 4391-F stuck during charging but was removed with forces up to 2000 pounds. (See section on Production Tests.)

Draw-Down Test - Results of full pressure shutdown flow showed the 105 flowmeters to be within the specified accuracy range for these instruments.

Enrichment Loading - Sixteen "E regular metal" columns were charged to provide reactivity for improved flattening.

C. Improvement Experience

1. Production and Process Tests

Production Test IP-35-A - "Measurement of Slug Jacket Corrosion Rates" - Two tubes were charged during the month.

Production Test IP-58-A - "Evaluation of Alpha Extruded Solid Uranium Fuel Elements" - Sixteen tubes were charged during the month.

Production Test IP-25-A - "Graphite Burnout Monitoring Program" - Irradiated graphite samples in Channel 3580 were discharged and new samples recharged.

Production Test IP-98-1 - "Revised Tube Charge Pattern for Graphite Annealing" - Initial loading of 286 tubes below Row 36 with the revised pattern was completed. The test authorizes centering the charges on all tubes below Row 38, 16 inches forward, either by back-seating or charging one extra HM piece and one extra dummy.

Production Test IP-15-D - "Special Irradiation Request - HAPO 184" - Three short-term irradiation samples were processed in PCCF tubes during the month.

2. Projects

CG-558 - "Reactor Plant Modification for Increased Production" - An eight-inch concrete slab was poured over the outer rod room floor for shielding purposes by Construction forces. Paving and cleanup work continued.

CG-667 - "Improved Space Utilization" - This project was completed and accepted with minor exceptions during the month.

Other Projects - Work continued on Project CG-665 - "Metal Elevator for C Elevator", and Project CG-583 - "Moisture Monitoring System for the Detection of Leaking Process Tubes".

D. Events Influencing Costs

During the month of July, the F Processing Operation used 109 man-hours of nonexempt overtime.

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Events Influencing Costs (Continued)**DECLASSIFIED**

Unit cost is expected to be below forecast, chiefly because of the high production.

F POWER OPERATIONA. Operating Experience

1. The 440 Volt supply for building air supply units in 190-A Building was interrupted for approximately 10 minutes on July 14, when a circuit breaker opened as a result of short circuit, caused by outside overhead lines swinging together during heavy wind. No damage resulted.
2. While No. 2 process pump in 190-A Building was being started on July 18, the No. 3 process pump and high tank pump in 183 Building tripped out. The undervoltage protection for this equipment and other sources of difficulties are being studied to determine the cause.
3. The accuracy of process water flowmeters in 105 and 190 Buildings were checked against draw-down of process water storage tanks in 190 Building on July 16. The flow-indicating gages located in 190 Building control room were found to be indicating flow below the minimum specified accuracy range of these instruments. Details of test are covered in separate report issued by Process Technology Operation.
4. Spontaneous combustion in the coal storage bunkers in 184 Building resulted in ignition of a small area in No. 3B Bunker at 4:30 p.m. on July 12. The White Bluffs Fire Operation was called to assist in extinguishing the fire. Damage as a result of the fire was negligible. A stepped-up program of continuous coal movement in the bunkers has been instituted as a preventive measure against a recurrence of this incident.
5. An excessive amount of Anthrafilt filter media loss has been noted as a result of present high filter flow rates. A study is under way to improve filter performance and reduce loss of filter media from filter beds.

B. Equipment Experience1. 183 Building

- a. The process water pump motors No. 4 and No. 5 were partially dismantled, cleaned, and inspected because of operation under dusty conditions during CG-558 modification work of chipping concrete.

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183 Building (Continued)

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- b. Replacement of the 18-inch gate valve in discharge line for No. 1 process pump with a new valve on July 17 was necessary because of the badly worn condition.

C. Improvement Experience

1. Projects

CG-558 - "Reactor Plant Modification for Increased Production" - Installation of material and equipment in 190 Building Annex basement for noise abatement was started on July 10, and is approximately 40 percent complete. Installation of additional lighting in the basement is nearing completion.

The installation of panel for the type HGA relays for process pump motor control in 190 Building Annex is 50 percent complete.

CG-714 - "Replacement of Steamline Support Poles" - Replacement poles have been received for this project.

2. Other Improvements

The replacement of wooden handrails for four sedimentation basins at 183 Building with standard steel piping handrails was completed on July 10.

Replacement of deteriorated wooden enclosures for vent valves on raw water export line between F Area and H Area lateral line was completed on July 16.

D. Events Influencing Costs

1. Overtime

A total of 72.1 overtime hours was worked in F Area.

2. Other

Reduced chemical costs due to the improved raw water quality.

Coal costs remain high due to low evaporation rates during normal operating periods of low steam demand.

Maintenance costs were high due to repair work on boilers and equipment in 184 Building.

F RADIATION MONITORING OPERATION

A. Radiation Occurrences

One lapse of control occurred on July 18, as a result of a pump failure

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Radiation Occurrences (Continued)

in 1608-F Building. The exhaust air tunnel was flooded with water restricting the exhaust air flow from the 105-F Building, allowing gas activity from reactor gas leaks to build up in the 105-F Building. Personnel were exposed to 15 mrads/hr in the control room. No over-exposure of personnel resulted from this occurrence.

B. External Exposure Control

The maximum dose rate of 3 r/hr was incurred during preparations to remove a solid aluminum dummy from a rear face ball valve nozzle. The dose rate in the Processing Operation office at 105-F Building was reduced from about 5 mr/hr to 1 mr/hr by the additional concrete shielding installed in the outer rod room.

C. Contamination Control

The radioactive effluent vapor problem in the 105-F lunchroom was corrected by the repair of a broken rod water drainline.

D. Events Influencing Costs

A total of 47 hours of overtime was worked by Radiation Monitoring Operation personnel in F Area.

F MAINTENANCE OPERATION

A. Equipment Experience

1. Instrument - The reactor scram on July 23 was due to a rupture of the Bourdon tube of Panellit gage 2169. This is the second such Panellit gage failure since the CG-558 outage. Panellit gage failures of this type are being investigated by Research and Engineering Operation engineers.
2. Electrical - The major electrical activities were related to the Class "A" overhauls of the Nos. 2, 3, 4, and 5 flocculator motors and controls at the 183-F Building; overhaul of the coal conveyor motors and controls at the 184-F Building and overhaul of Nos. 4 and 5 process pump motors in 183-F Building.
3. Mechanical - During the outage of July 16, gas leaks at the near, front corner of the F Reactor neoprene seal were repaired and the front ball valve on tube 1568 was replaced.

Major activities related to the water area involved the overhaul of the Nos. 2, 3, 4, and 5 flocculators, and overhaul and modification to the Roberts filter three-way control valves at 183-F Building, and overhaul of the coal conveyor equipment at the 184-F Building.

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Mechanical (Continued) - The firebox insulation work on the 184-F Boilers is approximately 65 percent complete.

B. Shift Maintenance Activities

The major activities of the F Maintenance Operation shift personnel consisted of fabrication of tools for use with the 190-F Annex equipment, revising the 105-F Reactor heating system piping, installing water to outer rod room floor drain traps, and work connected with the reactor outages during the month.

C. Maintenance Engineering, and Planning and Scheduling

1. Instrument Engineering - The Instrument Engineer's activities involved the relocation of the 107 inlet HM chamber to eliminate a vibration problem, and preparing a wiring diagram of the CO₂ analyzer system.
2. Electrical Engineering - Efforts of the Electrical Engineer have been devoted primarily to "as-built" drawings of the Ball 3X system and other electrical revisions in the 105-F Building.
3. Mechanical Engineering - Activities included a study of the 105-F Building heating system; a study of the Ball 3X vacuum pump, and work with other I.P.D. engineers in studying the future course of action to be taken in regard to the 1608-F pump system.
4. Planning and Scheduling
 - a. Property Control - The primary efforts in property control during this period have been concerned with the disposal of excess equipment and materials.
 - b. Productive Maintenance - Approximately 43 percent of available manpower, not including service work, was applied to Productive Maintenance activities during this period.

D. Events Influencing Costs

A total of 55.2 man-hours of overtime was worked by F Maintenance personnel in maintaining F Reactor facilities.

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S. L. Nelson
S. L. Nelson, Acting Manager
F REACTOR OPERATION

SLN:GBJ:rsu

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H REACTOR OPERATION

July, 1957

DECLASSIFIEDI. ORGANIZATION AND FUNCTIONS

No change.

II. PERSONNELA. Force Summary

	June 30			July 31			Net
	<u>NE</u>	<u>E</u>	<u>Total</u>	<u>NE</u>	<u>E</u>	<u>Total</u>	<u>Change</u>
General	1	1	2	1	1	2	0
Plant Administration Oper.	2	3	5	1	3	4	- 1
Processing Operation	36	9	45	37	9	46	+ 1
Power Operation	69	11	80	67	11	78	- 2
Radiation Monitoring Oper.	12	4	16	12	5	17	+ 1
Maintenance Operation	82	16	98	84	16	100	+ 2
Central Maintenance Oper.	75	15	90	71	16	87	- 3
Total	277	59	336	273	61	334	- 2

B. Movement of People

R. K. Browning was reassigned from Junior Engineer, Central Maintenance Operation to Supervisor, 100 Operations II, Processing Operation, all within H Reactor Operation.

K. W. Greager was transferred from Facilities Engineering Operation to H Reactor Operation as Supervisor, Radiation Monitoring, Radiation Monitoring Operation.

K. B. Sowa, formerly a Technical Graduate, was transferred to the Central Maintenance Operation of H Reactor Operation as a Junior Engineer.

J. N. Charlton, Supervisor 100 Operations II, was transferred from Processing Operation, H Reactor Operation to B Processing Operation, B/C Reactor Operation.

M. W. Durkin, Painter Journeyman, was temporarily promoted to Supervisor, Painting during the month of July to provide vacation relief in the Central Maintenance Operation of H Reactor Operation.

There were 11 transfers into H Reactor Operation, nine transfers out, three terminations, and one deactivation.

III. PERSONNEL ACTIVITIES

Twelve exempt employees attended meetings, courses and conferences as follows:

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General Manager's Information Meeting 6
"Understanding People" 5
Labor-Management Relations 1

IV. SAFETY AND SECURITY

There were no disabling injuries, serious accidents or security violations during the month. Nineteen medical treatment injuries were reported.

V. NON-ROUTINE REPORTS

"Cost Reduction Program, H Reactor Operation," R. T. Jessen to P. D. Lee dated July 15, 1957.

"Proposed Maintenance Overtime Procedure," W. J. Ferguson, dated July 10, 1957.

VI. INVENTIONS AND DISCOVERIES

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

VII. COMPONENT ACTIVITIES

H Plant Administration Operation

A. Administration

Coordinated the redistribution of IPD mechanical maintenance shift personnel to be effective August 5.

As necessitated by the above redistribution of shift maintenance forces position guides for the Maintenance and Central Maintenance Operations were reviewed to determine what revisions were necessary. At month end, revising and rewriting of the guides was progressing.

On July 18, as part of IPD Orientation Day for new technical employees at HAPO, 17 summer junior employees were given a full day tour of 100-H Area water plant, steam, and reactor facilities.

Coordinated arrangements for the July 12, 100-H Area practice evacuation as a part of the civil defense test, Operation Alert 1957.

DECLASSIFIED**B. Cost Control**

On the basis of individual Level No. 4 reports, compiled a cost reduction program for H Reactor Operation.

With the cooperation of the Financial Operation, developed a new system of reporting expenditures by individual maintenance supervisors which permits pinpointing the origin of material and labor costs and will, in effect, make each supervisor accountable for his costs.

C. Landlord

Requested preparation of a project proposal to provide an automatic sprinkler system for Buildings 1703-H, 1760-H, and 1761-H as required by Company Standards for the protection of vital records.

Issued a work order to Construction Operation to provide blacktop sidewalks and paving in 100-H Area where the need has been indicated by occupancy of Buildings 1760-H and 1761-H, and by post-Project CG-558 occupancy changes.

H Processing Operation**A. Production**

Input production was 71.5 per cent of forecast as the result of problem tube rehabilitation performed at the conclusion of the Project CG-558 outage while working conditions were optimum, and a tube outage not included in the forecast. A new maximum operating level exceeding the previous high by 25 units was established. Equilibrium power levels were limited by the amount of reactivity available for effective control of graphite and tube temperatures.

B. Operating Experience**1. Operating Continuity**

The operating continuity of H Reactor was affected by the events listed below:

<u>Day</u>	<u>Hours</u>	<u>Reason</u>
1	87.7	The Project CG-558 outage continued 87.7 hours into July.
4	2.0	Shut down to repair thermocouples on newly charged tubes.
8	0.5	Scrammed during a process water pump change.
9	0.6	Scrammed because of an unexplained Panellit trip.
9	27.1	Scrammed by a spurious trip of a process water Mercoid switch. Insufficient reactivity prevented resumption of operation.

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1. Operating Continuity (Cont'd)

<u>Day</u>	<u>Hours</u>	<u>Reason</u>
12	0.4	Scrammed when the wrong poison column control ball valve was opened.
22	147.8	Shut down for scheduled charge-discharge and tube replacement.
28	2.4	Shut down to repair thermocouples on newly charged tubes.
28	1.4	Scrammed when the wrong poison column control pig-tail ball valve was closed.

2. Equipment Experience

Process Tube Thermocouples - Twenty-two of the newly installed rear face thermocouples failed. The couples were fabricated by twisting the wires together, soldering them, and cutting off the extra length. Apparently too much wire was cut off, allowing the twist to come apart and open the thermocouple.

Crossheader No. 31 - While investigating abnormal Panellit pressures during the Project CG-558 startup preparations, plastic material was found lodged in several venturis on crossheader No. 31. A plastic face shield appears to have been the source of this material. Three venturis have become partially clogged since.

Process Water Mercoids - One scram and one minimum outage resulted from premature trips of the low pressure process water switches caused by plus or minus 30 psi oscillations in the riser pressure signal and the fact that the Mercoid trip settings must be over-pressured by at least 30 psi to effectively seal in the contacts. Work is in progress to dampen the pressure oscillations by injecting oil into the sensing lines.

C. Improvement Experience

Gas Consumption - Current gas consumption has been reduced to 40 per cent of the pre-Project CG-558 outage usage through effective leak detection work and application of plastic spray.

Process Ventilation - The ventilation balancing personnel from the 200 Areas completed the balancing of the process ventilation system with satisfactory results.

D. Events Influencing Costs

Overtime usage was 113 hours, about equally divided between shift change coverage and minimum crew coverage.

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DECLASSIFIEDH Power OperationA. Operating Experience

Process water flow to the reactor was increased to normal on July 3, with seven annex pump units. During the month, flow was reduced five times for a total of 243 hours.

The normal steam generating rate was 44 Mlbs/hr, with an average of 39 Mlbs/hr. An evaporation rate of 7.66 lbs. steam/lb. coal was attained.

A leak occurred in the 14-inch raw water line to Building 184-H at the southwest corner of Building 182-H on July 1. Repairs were completed by Minor Construction forces and normal services were restored.

Analytical Laboratories performed routine control services and special analyses on 125 essential material samples, 60 water samples, 111 process control samples, and seven special samples.

B. Equipment Experience

Repairs were completed at Building 182-H on the chlorine solution line from Building 183-H to No. 1 Inlet House.

At Building 183-H, several ruptured diaphragms have been experienced on the bottom differential controllers for the filter rate of flow valves. Failures were attributed to twisted linkage cables. Non-twist cables have been installed on 11 of 16 units.

An exploratory excavation was made on the north side of Building 183-H head house on July 17, to determine the cause of roadway settlement. No water leaks were found, and the excavation was backfilled.

Class "A" inspections were completed on No. 4 forced draft fan and the steam air compressor in Building 184-H.

At Building 190-H Annex, comprehensive alignment checks were made on Nos. 1 and 7 pump units on July 8 and 9, due to horizontal and vertical movement of the pump shaft. No abnormal conditions were observed. The flexing of the shaft was attributed to hydraulic unbalance which should be suppressed or corrected when the new choke rings are installed. The outboard pump seal on No. 8 Annex pump unit was repaired on July 24.

C. Improvement Experience

Minor Construction forces continued the correction of Project CG-558 punch list items and building and equipment painting.

H Radiation Monitoring OperationA. Radiation Occurrences

There were no radiation incidents involving overexposure of personnel. Five Lapses of Radiation Control were recorded, three of which actually occurred

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in June, but were delayed because of necessary investigation. In all cases, spread of contamination to personal clothing or skin was involved. The assigned cause was lack of care either in working with contamination, or in removing protective clothing when leaving the radiation zone. Six men were involved in these lapses, none of whom received any significant exposure.

B. External Exposure Control

Lower effluent water activity has apparently resulted in reduced dose rates in the discharge area. However, the dose rates are still above what is considered normal.

Initial trials of discharge area air tool equipment indicated that this equipment will result in better radiation experience through reduced time to perform the work and simplified timekeeping.

Reduction of the number of air channels, and careful shielding of the remaining ones held down the front face dose rate during operation to an average level of 20 mrem/hr.

The new front face connectors are presenting a radiation problem. The surfaces of the connectors trap contamination readily, and cannot be decontaminated satisfactorily. Dose rates to 20 mrads/hr at the charge elevator railing have resulted.

Removal of shielding from around the out-of-pile portion of the KAPL-120 Loop to permit x-raying welds resulted in fast neutron dose rates as high as 575 mrem/hr. Efforts to shield the area remotely were not effective and the area was restricted until the shielding can be replaced.

The Ball 3X vacuum pump filter was replaced for the first time. The maximum personnel dose rate was 150 mr/hr.

Flash readings of 10 mr/hr were obtained in the central viewer during operation of the poison column control tubes. This is the only significant radiation exposure resulting from this operation to date.

C. Contamination Control Experience

During the ventilation balance work, a serious effluent vapor problem was located and corrected by repairing the far downcomer inspection cover.

Four cases of skin contamination were reported during the month with the maximum level 15 mrads/hr. Two cases of low level contamination to personal clothing were also reported.

A reading of 2,000 c/m was found in the cab of the Processing Operation pickup truck during trash burial operations. Fifty-one other vehicles were surveyed and found free of contamination.

D. Radiation Training

Principle training efforts were devoted to the Radiation Protection Information program. In addition, Radiation Protection Topic No. 3, "Preventing

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Contamination Spread," was presented to shift people in the Processing and Maintenance Operations and day people in the Maintenance Operation.

Approximately 20 students in the AEC Fellowship Program spent a week observing reactor radiation protection methods and procedures in IPD.

E. Events Influencing Costs

A total of 195 hours of overtime were required during the month, primarily for monitoring service during tube replacement work.

H Maintenance Operation

A. Equipment Experience

Leak Detection - The over-all leak detection program was hampered by a poor joint at a valve in the leak detector. The joint was silver soldered, and the detector was completely overhauled.

Building 190-H Annex Valve Pit - The vibration in this location results in a high noise level, requiring installation of a lining at critical points to reduce the level.

Panellit Ground Detectors - This installation was completed.

"D" Elevator - A slow speed up-and-down switch was installed to enable operators to "jog" the elevator without the time delay in the normal operating system.

Weed Spray - The weed spray program was completed in the area, including the small spots which were missed during the major part of the program.

Floors Sealed - Approximately 60,000 square feet of floors were sealed by the crew during the month.

Problem Tubes - Following the Project CG-558 outage, 19 problem tubes were removed from the reactor. Eighteen of the channels were re-tubed at that time and the remaining channel re-tubed during the outage of July 22. Two problem tubes remain.

B. Shift Maintenance Activities

Shift maintenance personnel spent the major portion of their time in 100-H Area on tube replacement, problem tube removal, and accomplishing cold work assignments within the area.

C. Maintenance Engineering, Planning, and Scheduling

CO₂ Storage Temperature Control - A study of the six-ton liquid CO₂ storage tank heaters is being made to reduce or eliminate the freeze-up problems.

Panellit Row Relay Study - A study on row relays to determine optimum pick-up voltage and contact pressure resulted in a recommended spring tension of approximately six to eight ounces. The pickup voltage at this tension is

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approximately 15 volts.

Craft Training - Electrical craft training classes were held to stress the revised portions of the critical circuits of Building 105-H. Emphasis was placed on using logical procedure in finding component failures in such systems as the Panellit, ground detector and power failure circuitry.

Heating Coils - Building 105-H Supply Air - Recommendations for changes in the steam supply and condensate piping on the air supply heating coils have been submitted together with sketches and cost estimates. These changes should eliminate the pre-heater coil freeze-up problem.

Property Management - The 14 electric 800 hp motors were successfully decontaminated by Minor Construction forces, and were excessed. This completes the excessing phase of Project CG-558.

Work Scheduling - Daily scheduling of work by each foreman continues, and is being monitored closely to be certain information presented on the schedules is clear. Planned work of major significance is reviewed with appropriate engineers or planners on a daily basis.

Productive Maintenance - The productive maintenance program returned to a normal schedule during July. A system adopted two months ago whereby all Class "A" overhauls are accounted for by means of special PM work orders, is proving to be an accurate source for material and labor costs applied for the specified work. Measurement graphs for each foreman and a composite graph system were provided for the purpose of recording the monthly progress of the PM program.

D. Events Influencing Costs

Costs were influenced negatively by problem tube rehabilitation, the tube outage of July 23, and 277 hours of overtime required in 100-H Area.

Central Maintenance Operation

A. Tube Activities

Below is a tabulation of process tube activities:

	<u>B</u>	<u>C</u>	<u>D</u>	<u>DR</u>	<u>H</u>	<u>F</u>	<u>KE</u>	<u>KW</u>	<u>Total</u>
Problem Tube Channels Cleared:									0
Ruptures Removed:	1	4	1	4			2		12
Stuck Charges Removed:			1						1
Tubes Pressure Tested:	30	4	8	4	76		1		123
Tubes Installed:	29		7	5	61				102
Tubes Split and Removed:	30		5	2	58				95
Scheduled Outages:	1	1	1	1	2	1	2	1	10
Unscheduled Outages:	3	4	1	4			2	2	16
I & E Nozzles Installed:		354							354

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DECLASSIFIED**B. Machine Shop**

The work backlog has been reduced to 30 crew days primarily as the result of completion of first phase repairs to Project CG-558 process pumps and improved work methods within the shop. Fabrication work of special interest included an improved expanding mandrel adapted for K Reactor use, a rib sizing tool for process tube, and a boring bar for reboring K Reactor step plugs.

C. Fabrication Shop

Installation of the power brake press was completed. Fabrication work was concentrated on air conditioning facilities, glare baffles, pickup tongs and assembly of warehouse shelving and storage racks.

D. Paint Shop

The exterior paint program was concentrated at 100-B and D Areas during the month. Carpenter repair has been a major item because of inadequate routine maintenance in the past.

E. Building 108-D Regulated Shop

Activities in addition to normal reactor tool repair included new tool development, and the reboring of 366 I & E nozzles for C Reactor.

F. Central Maintenance Engineering

Machine and Spray Metalizing - K. H. James, Field Engineer for Metalizing Engineering Company, Inc., Seattle, Washington spent three days investigating metalizing methods and equipment. Colored movies were shown and a demonstration of the latest type gun was given. A complete report was provided by Mr. James and is available in Central Maintenance Operation files.

Adaptation of Existing Tools to Air-Power - Adaptations of existing tools to air-power for tube outages were tested during the H Reactor outage on June 22. The test indicated that adaptation had been successful in some cases, but that additional development was necessary in other cases.

R. T. Jessen
R. T. Jessen, Manager
H Reactor Operation
IRRADIATION PROCESSING DEPARTMENT

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KE-KW REACTOR OPERATION JULY, 1957

I. ORGANIZATION AND FUNCTIONS

There were no changes of assigned responsibilities during the month. The name of the Plant Administration and Personnel Development Operation was changed to Plant Administration Operation by IPD directive.

II. PERSONNEL

A. Force Summary

	<u>June 30</u>			<u>July 31</u>			<u>Net Change</u> <u>of</u> <u>Total</u>
	<u>E</u>	<u>NE</u>	<u>Total</u>	<u>E</u>	<u>NE</u>	<u>Total</u>	
General	1	1	2	1	1	2	0
Plant Admin. Operation	4	1	5	4	1	5	0
KE Processing Operation	10	35	45	10	35	45	0
KW Processing Operation	9	36	45	9	36	45	0
Power Operation	13	75	88	13	76	89	1
Rad. Mon. Operation	6	19	25	6	19	25	0
Maintenance Operation	20	136	156	20	135	155	-1
Supplemental Crews	<u>10</u>	<u>66</u>	<u>76</u>	<u>10</u>	<u>65</u>	<u>75</u>	<u>-1</u>
	73	369	442	73	368	441	-1

B. Movement of People

There were four Technical Graduates, one summer program college junior and one Technician Trainee assigned at the end of the month.

There were no exempt transfers during the month. Non-exempt changes included four transfers in and five transfers out.

III. PERSONNEL ACTIVITIES

The Plant Manager and Level IV Managers conducted tours of the facilities for eighteen college junior technical personnel of the HAPO Summer Work Program.

L. B. Brown attended the GE Salary Plan training course.

Seven Level V supervisors attended the first two sessions of the six-part course on "Understanding People" given by Dr. J. C. Conant, Plant Psychologist.

R. J. Bursey attended a paperwork clinic being held for Financial Operation by W. Engesser, Professor from Oregon State College on summer hire.

Mr. F. H. Trones, Representative of Byron Jackson Pump Company, conferred with 1706 Building Maintenance supervision to discuss spare parts inventory for that building.

IV. SAFETY AND SECURITY

There were no disabling injuries during the month. Ten medical treatment injuries were reported for a frequency rate of 1.27 for the month.

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The K Plant Safety Council sponsored a safety quiz during the month in which all Operations participated. The Irradiation Testing Operation of R & E was declared the winner on basis of percentage score.

No security violations were incurred.

V. NON-ROUTINE REPORTS

None.

VI. INVENTIONS AND DISCOVERIES

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.

VII. COMPONENT ACTIVITIES

KE-KW PLANT ADMINISTRATION OPERATION

A. Administration Activities

In connection with the forthcoming IPD Employee Attitude Survey, a breakdown of survey result requirements for the Plant was submitted to Employee Relations.

A priority listing of candidates for the PBM-I Course was submitted to the Personnel Development and Placement Operation.

B. Personnel Development

A series of four meetings on the Productive Maintenance Program was held during the month. E. W. Baker and KE-KW Maintenance supervisory personnel conducted the meetings.

V. R. Griffith, Training Specialist, made training contacts with four exempt and 65 non-exempt personnel of the IPD Power Operations.

Three meetings with the IPD Power Managers were completed by the K Plant Administration Manager and the Training Specialist. The Power training progress is being reviewed and future programs developed.

C. Cost Control Activities

Arrangements were made with Product Cost and Budgets Operation to issue a report "Analysis of Supplies, KE-KW Reactor Operation". This report is to provide a cost breakdown of the "402" supplies account classification code.

An initial cost analysis of the irradiation of different types of fuel elements in a K Reactor, applying the incremental cost approach, was completed. This was coordinated with L. W. Lang and A. P. Vinther.

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A report on the cost reduction efforts was issued to the IPD Cost Reduction Task Force. Two dinners for K Plant exempt personnel, followed by "brainstorming" sessions on cost reduction, were held during the month. Two hundred and fifty ideas are currently being analyzed.

D: Landlord Activities

A description of space and facilities available in K Plant, for a proposed area Red Cross blood drawing, was submitted to the IPD Communications Specialist.

KE PROCESSING OPERATION

A. Production

Input production was 102.6 percent of forecast. The maximum level for the month was 95 units below the previous high. Levels were limited by the slug rupture rate tube power limit of 1225.

B. Operating Experience

1. Operating Continuity

Outage time for the month totaled 145.5 hours. Operating continuity was affected by the following events:

<u>Day</u>	<u>Hours</u>	<u>Remarks</u>
8	38.7	Scheduled outage for metal processing.
19	42.1	Ruptured slug in tube 2372-KE. (Production Test IP-43-A material)
25	37.0	Scheduled outage for metal processing.
29	0.5	Scram caused by failure of a 1706-KER pump control circuit transformer.
30	27.2	Ruptured slug, (regular metal), in tube 2747-KE. Outage was utilized for replacement of the downcomer orifice plate. At month end, work on removal of the tube from channel 2747 was in progress.

2. Equipment Experience

- a. Ruptured Slugs - Removal of the two ruptured slugs that occurred could not be accomplished by the normal stuck slug removal procedure. Forces greater than normal were required for removal of the process tubes. Channel 2372 was left empty for charging graphite burnout samples. Work was in progress on tube 2747-KE at month end.
- b. Pressure Monitor System - Fourteen Panellit lines showed slow response time and the plugged fittings at the venturi were replaced. Two hundred and twenty-five new Panellit gages were installed bringing the total of installed new gages to 601.

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- c. Vertical Safety Rods - Number 23 VSR was removed from the reactor for straightening. It was replaced by a rod that had been stress relieved and straightened in the 200 Area shops. Work is in progress to "cold straighten" VSR Number 23.
- d. Effluent Line - A leak was found in the 72 inch effluent line at the dresser coupling in the effluent line tunnel outside of 105-KE. Repairs were completed during the July 29 outage.
- e. Power Calculator System - As the result of a study of the power calculator system by J. R. Fishbaugher, Processing supervisor, shield cooling power compensation factor for the K Reactors was recalculated. A corrected factor was established by the Process Engineer and placed into effect on July 25. The KE Reactor recorded power level was increased by 21 units due to the change. Details of the calculations will be found in document HW-51798, "Shield Cooling Power Compensation Factor".
- f. KER Pump Failure - Failure of the Number 1 pump controller transformer at KER resulted in a reactor scram on July 29. Recovery from the scram was successful. Loops 2 and 3 were operated on one pump each until temporary corrections were effected on the following outage.

C. Improvement Experience

1. Production and Process Tests

- a. PT 1P-43-A-84-MT, Evaluation of the Uniform Corrosion Resistance of M-388 Alloy Slug Jackets - Special sample lines were installed from the rear nozzles of tubes 2668 and 2569 to the water sample room. Two tubes were charged with PT 1P-43-A material on July 8, and four were discharged. On July 19, a Z-124 lot regular metal piece ruptured in tube 2372 which also contained PT 1P-43-A material. As a result of the rupture, three additional tubes of this PT material were discharged since the exposure of the charges was considerably above normal.
- b. PT 105-550-E, Inpile Facilities of 1706-KE - Four 1706-KE tubes were processed with material for this PT on July 8.
- c. PT 1P-61-A, Irradiation of 1.44 Inch Diameter Cored Self-Supporting Elements in KER Facility - Material of the PT was discharged from KER tube 2864 (Loop 2) on July 25. New test elements were charged into KER tube 3565 (Loop 3) on July 8.
- d. PT 1P-75-A, Irradiation of 1.80 Inch Massive I and E Fuel Elements in the 1706-KER Recirculation Test Facility - The first charge of "Cow" slugs covered by this PT was charged into KER tube 2864 (Loop 2) on July 25.
- e. PT 1P-46-A, Irradiation of Seven Rod Cluster Fuel Elements in a KE Front to Rear Test Hole - Front to rear test hole 3674 was discharged and recharged with "B" material on July 25.

KW PROCESSING OPERATION

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A. Production

Input production for the month was 101.3 percent of forecast. The maximum instantaneous level attained during the month was 135 units above the high reached in April. Maximum tube powers were increased 50 kw above that previously attained.

B. Operating Experience

1. Operating Continuity

Outage time for the month totaled 180.5 hours. Operating continuity was affected by the following events:

<u>Day</u>	<u>Hours</u>	<u>Remarks</u>
4	61.9	Scheduled outage for processing metal and replacement of downcomer orifice plate.
7	5.5	Outage to discharge 18 temporary poison columns.
7	1.9	Manual scram due to failure of Number 2 HCR controller to operate. Repairs were completed.
13	0.4	Panellit trip caused by loss of water pressure when KE V-73 guard valve opened during a routine test. Recovery was attempted.
13	29.0	Failed to recover from the V-73 scram. Outage utilized for processing metal.
14	2.0	Spurious temperature monitor trip from tube Number 1080-KW. Reactor recovered.
15	0.5	Panellit trip due to a faulty jumper.
15	0.3	Panellit trip caused by a ground in the Panellit system.
28	73.8	Unscheduled outage caused by Ball 3X drop due to C riser VIP Mercoid pressure sensing line failure. Outage was extended by 190 high lift pump difficulties. Outage time was utilized for processing metal, ball recovery, graphite stringer installations, routine maintenance and 190 high lift pump repairs.
31	5.2	Manual scram necessitated by a temperature monitor thermobulb failure on newly recharged tube Number 1270. This outage extended into 8-1-57 to complete repairs.

2. Equipment Experience

- a. Reactor Flow - The downcomer orifice plate was replaced during the July 4 outage to permit reactor downcomer flows in excess of 160,000

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gpm. A complete Panellit gage base revision was also completed to permit the increase in individual tube flows. Total reactor flow for the remainder of July was increased to 165,000 gpm, which permitted the scheduled increase of 50 kw in maximum tube powers. Difficulties with the electrolyte controllers of the high lift pump during the July 28 outage delayed startup about 12 hours.

- b. Panellit System - Two reactor scrams resulted from Panellit trips. One resulted from the use of a faulty jumper during a gage change and the other from a ground caused by water on a gage.

Thirty-six plugged sensing lines were found and corrected during line flow tests.

During the month, 133 new type gages were installed. A total of 263 have been installed to date.

- c. Temperature Monitor - Six temperature monitor trips were experienced at KW Reactor during the month. Two were spurious nature while the others occurred below the set trip point. Seven thermobulb failures occurred. The reactor was shut down on July 31 to effect repairs on the thermobulb of tube Number 1270-KW, a newly charged tube. Repairs were completed.
- d. Ball 3X System - Forty-nine of the fifty-one Ball 3X hoppers were tripped on July 28, when a soft solder fitting in the C Riser, Battery B, VIP Mercoid sensing line failed. Hopper Number 55 did not trip because it had been taken out of service while the VSR was being straightened. At present, no explanation has been found for the failure of hopper Number 37 to trip. All ball hoppers were refilled within a 50 hour period.

Design Change 173-K, "Dual Sensing Lines for Pressure Outlets", was in final stages of authorization at the time of the Ball 3X system failure. This Design Change provides for a dual sensing line system that will not permit a ball drop from the failure of one sensing line.

- e. Horizontal Rods - Failure of the controller mechanism of Number 2 HCR caused a reactor shutdown on July 7. The controller was repaired and the reactor returned to operation.

HCR Number 16 failed to go in under scram conditions during the July 28 outage. Repairs were completed prior to reactor startup.

- f. Graphite Stringers - Defective graphite stringer RS-8 was removed from KW Reactor and two new stringers, RS-8 and RS-9, were installed during the July 28 outage. It was found necessary to ream the near side gunbarrel of RS-9 channel before RS-9 could be inserted all the way into the reactor.

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DECLASSIFIEDC. Improvement Experience1. Production and Process Test

- a. PT IP-70-A-80-MT. "Irradiation of Lead Dipped Canned I and E Slugs in K" - Six additional C design slugs were added to the partial column of this type material in tube Number 2083-KW. The test has operated without incident.

D. Events Influencing Csts1. Overtime Usage

A total of 327.7 manhours was required to meet charge-discharge, ball recovery and operational requirements in July. In addition, 48 man-hours of exempt overtime were required.

KE-KW POWER OPERATIONA. Operating Experience1. High Lift Units, 190-KW

Malfunction of the liquid rheostats caused the extension of a reactor outage on July 31 following a concentration change of the electrolyte solution from 0.8 percent sodium carbonate to 1.2 percent. The change was made to permit wider spacing of the electrodes at maximum speed and to prevent electrode fusing. Readjustment of the electrode controls on the units corrected the difficulty.

2. Electrical Peak Control Efforts

Eight-reactor operation required the use of interruptible power for three different periods during the month for peak control. Approximately 40,000 KW hours were used during a six-hour period on July 6 and 7, approximately 129,000 KW hours during a 11.5 hour period on July 20 and 21, and approximately 85,000 KW hours during a 7.5 hour period on July 27 and 28.

3. Maximum Water Flow - 165-KW

Maximum six-pump flow at 165-KW was attained on July 8 when all six rheostat by-pass breakers were closed. Operation in this manner has continued in 165-KW throughout the month.

B. Equipment Experience1. High Lift Trip-Out Test

Two high lift unit trip-out tests were conducted in 190-KE on July 26 as directed by Reactor Engineering Operation. The first test consisted of tripping out one high lift unit; the second test consisted of tripping out two high lift units simultaneously. Derived flow and pressure delay data will be evaluated and documented by the Reactor Engineering Operation.

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The separate contract work for cutting four openings in the 165 Building roof and mounting blastproof weather cowls was completed on July 5. As an added measure of relief, the five existing exhaust fans located in the wall between the boiler room and pipe tunnel were reversed on the 165 Buildings on July 26 to supply additional air to the boiler room. Design work on the main ventilation project scheduled for completion August 15 is progressing on schedule. Design investigation of the feasibility of providing duct work to supply hot air from above the boilers to the forced draft fans is continuing, although space limitations may rule out this desirable feature.

D. Events Influencing Costs**1. Fuel Oil**

First tank car shipment of Number 6 fuel oil was received on July 19 under the new contract. By increasing volume of rail shipments by the change from motor to rail transport of fuel oil to K Plant, an \$.08 per ton reduction of the coal billing rate to other IPD users, was achieved.

KE-KW RADIATION MONITORING OPERATION**A. Radiation Occurrences**

No Radiation Incidents were experienced during the month. Of nine Radiation Occurrences reported by Radiation Monitoring personnel, one was classified as a Lapse of Radiation Control. This Lapse involved the spread of contamination to the Transfer Area cask decontamination pit.

B. External Exposure Control

The maximum personnel dosage rates required for rupture removal work was 5 r/hr at 105-KE.

At 105-KW, a graphite-thermocouple stringer was removed at a maximum personnel dose rate of 300 mr/hr. The dose rate broadside from the stringer was 140 mr/hr at 100 feet.

The metal charge in tube 5589-KW was displaced 82 inches downstream during startup. The maximum dose rate observed on the rear nozzle was 200 r/hr. The average personnel dose rate to discharge the tube was 600 mr/hr at 8 feet.

During the 105-KW ball recovery operations following the ball drop during unit operation, maximum dose rates of 500 mr/hr were encountered for work in the Ball 3X tunnel. Dose rates for work in the rod enclosure were 20 to 50 mr/hr and to handle the ball return hose, 100 to 300 mr/hr.

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C. Contamination Experience

The 105-KE front face became contaminated to 7 rads/hr, including 200 mr/hr, during charge-discharge of a special tube. Decontamination of the nozzles, pigtails and "C" elevator reduced surface dose rates to 200 mrad/hr, including 100 mr/hr at two inches. The contamination raised the dose rate on the "C" elevator from 3 mr/hr to 10 mr/hr. Further decontamination attempts lowered the dose rate to 6 mr/hr.

The North Corridor of 1706-KER became contaminated to 200 mrad/hr, including 4 mr/hr, when effluent vapor was forced back through Number 1 strainer while Number 3 strainer was being flushed. The strainers are connected to a common drain. Decontamination efforts were successful.

At 105-KW, graphite contamination up to 20 rads/hr, including 750 mr/hr at 12 inches, spread to the top of the reactor during ball recovery operation. The contamination was carried to the top landing, machinery rooms, freight elevator, and experimental-level landings. Fourteen employees became contaminated on their skin and personal clothing during the ball recovery work. Decontamination efforts were successful.

KE-KW MAINTENANCE OPERATION

A. Equipment Experience

1. Instruments

- a. Pressure Monitor System - Corrections were made on 86 mercury separations. Adjustments were made to 5718 gages, 93 percent of these being range changes and checks completed during outages. During the month 313 new gages were installed.
- b. Gas System - The gas makeup panel was moved from the -8 foot level to the control room in both 105 Buildings under Design Change Number 167.
- c. HM Beckmans - 105-KE - Doors were installed on three critical HM Beckmans to enable better access and control of range changes.

2. Electrical

- a. Retention Basin Inlet Valves - The control circuit of the valve to "B" basin in 107-KE was rewired to effect a three-hour step-wise opening. This change is expected to reduce the temperature change shock to the basin chute. If the tests prove successful, "A" and "C" basins will also be changed.

3. Mechanical

- a. Raw Water Control Valve - 183-KW - A broken butterfly was replaced in the 36 inch rubber-lined valve in Number 2 header.
- b. Steam Generators - 165-KE - Gas leakage in generators in steam generators Number 2 and 3 was reduced by welding the cracks found

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during smoke pressure tests. New gaskets were installed on the hand hole plate covers.

- c. 1706-KE and KER - A new pump, tube nozzles and pigtails were installed after completion of piping modifications on Elmo Loop Number 2. A new rotometer to measure flow across the test section was installed.

A rupture safety box was fabricated to test zirconium tubes at high pressures and temperatures.

The broken hub on Westinghouse pump of Loop Number 4 was repaired by Maintenance forces. The pump and loop are in process of testing for inpile operation.

B. Shift Maintenance Activities

Shift work continued primarily in assistance on outage work and scheduled overhauls of equipment.

C. Maintenance Engineering, and Planning and Scheduling

1. Instrument Engineering

- a. Riser Mercoid Sensing Lines - A compression-type fitting was installed on the sensing line joint that caused the 105-KW ball drop. Hoke valves were also installed on the recalibration taps. It is expected the valves will reduce the strain on the manifold during testing. A design change has been issued to cover the correction of the sensing line piping arrangement.
- b. Rear Face Lead Wire - Temperature monitor lead wire inspections were made on both 105 Buildings to determine wire quality at the top of the unit for connection to terminal boards. The inspection revealed that the wire and insulation were satisfactory.
- c. Low Lift Pumps - The thermal overload relays will be modified according to recommendations from Electrical Design, C.E.O., on the basis of their study. The revised equipment will provide existing protection during continuous operation and will also allow a hot restart of the motors which existing relaying will not permit.

2. Planning and Scheduling

Class "A" overhauls were completed on 113 items of equipment and Class "B" overhauls on 137 items.

D. Events Influencing Costs

Overtime hours worked in K Area totaled 703.2 hours as compared to 536 hours last month.

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Hours worked in 1706 Building	- K Personnel	16.0
Hours worked in KE-KW Reactor Operation	- K Personnel	476.4
	- Others	<u>210.8</u>
Total in K Area		703.2
100-K Personnel in Other Areas		251.6

Total hours worked by K personnel in all areas was 744.0 hours, approximately 94 percent of the forecast.

SUPPLEMENTAL CREWS OPERATION

A. Events Influencing Costs

1. Overtime Usage

There were 310.2 hours of non-exempt overtime and 8 hours of exempt overtime worked by Supplemental Crews' personnel. All overtime was charged to the particular area involved.

2. Supplemental Crews' Time Distribution

The Supplemental Crews spent essentially all of their time on scheduled or unscheduled outages. The non-exempt time distribution was as follows:

<u>Area</u>	<u>Percentage</u>	<u>Area</u>	<u>Percentage</u>
100-B	14	100-F	6
100-C	20	100-H	21
100-D	10	100-KE	12
100-DR	8	100-KW	9

R. S. Bell
Manager
KE-KW Reactor Operation

RS Bell:GEG:prb

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PRODUCTION OPERATION

JULY, 1957

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I. ORGANIZATION AND FUNCTIONS

No change.

II. PERSONNEL

Force Summary

	<u>As of 7/31/57</u>			<u>6/30/57</u>	<u>Net</u>
	<u>Ex.</u>	<u>Non-Ex.</u>	<u>Total</u>	<u>Total</u>	<u>Change</u>
General	1	1	2	2	0
Prod'n Forecast'g & Sched'g	6	5	11	11	0
Computing & Machine Records	2	3	5	5	0
Reports & Statistics	2	2	4	4	0
Essential Materials	1	1	2	2	0
Totals	12	12	24	24	0

III. PERSONNEL ACTIVITIES

R. W. Bown participated in two sessions of the course "Understanding People" conducted by Dr. Conant of the Industrial Medical Operation.

W. G. Albert and T. W. Hauff attended the Information Meeting held by the IPD General Manager in 100-H Area on July 18, 1957.

T. W. Hauff attended the Data Processing orientation course given in W-10 and Bldg. 713 by Relations & Utilities Operation.

E. Bailey visited the Gas Ice Corp's. plants at Klickitat, Wash. (on July 2) and at Finley, Wash. (on July 18). M. R. Lipke visited the Finley plant on July 26.

IV. SAFETY AND SECURITY

All personnel attended safety and security meetings during the month. There were no injuries or security violations.

V. NON-ROUTINE REPORTS

None.

VI. INVENTIONS AND DISCOVERIES

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

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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.

VII. FUNCTIONAL ACTIVITIES

A. Production Forecasting, Scheduling and Analysis

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1. Production Forecasting

a. Official Forecast

The five-year official forecast for the period August 1, 1957 through June 30, 1962 was completed and issued as TS Document No. CLVI-21. It remains essentially the same as the forecast issued during May except for changes in the cored and I & E programs.

b. SS Materials Allotment Forecast

IPD requirements were reviewed and requests for the second and third quarters of FY 1958 were forwarded to the Fuels Preparation Dept. for inclusion in the overall production program allotment request.

2. Production Scheduling

a. Discharge Concentrations

The discharge concentration plan for regular uranium remained unchanged during July. Discussions were held with Research and Engineering personnel on a plan for using specific power as the basis for goaling E metal. A mathematical relationship was developed which makes it possible to apply this concept using available data processing equipment. Implementation of this plan should result in an immediate decrease in throughput of E metal at H Reactor, where a number of tubes operating at about 40 kw/ft. are in the discharge concentration range. Development work is continuing which should result in applying this concept to regular uranium.

b. Enrichment

E metal usage increased during July as shown by the following table:

Reactor	<u>Tubes Charged in June</u>			<u>Total Tubes in Reactor</u>		
	<u>Fringe</u>			<u>Fringe</u>		
	Poison	E for C	Spike	Poison	E for C	Spike
B	0	0	0	0	0	5 C Columns
C	0	3	0	0	10	0
D	0	0	0	0	0	22 / 5 C Columns
DR	0	0	0	74	0	10
F	0	0	16	0	0	16
H	25	20		25	106	0
KE	0	27	0	0	47	0
KW	0	46	0	0	57	0

The actual metal usage was not as great as these numbers indicate, because fewer peices were charged into each tube. This was possible through substituting regular metal for the depleted metal formerly used and for part of the E metal. A working arrangement was set up with the Operational Physics Operation which provides for a single contact as a means of scheduling E metal usage.

Production Scheduling assisted in choosing tubes for use in charging a fringe poison and compensating enrichment load in the top of H Reactor, minimizing losses due to the discharge of "green" metal.

c. Process Tube Replacement

The H Reactor problem tube outage scheduled for the end of the CG-558 outage was extended into July and resulted in recovery of 19 problem tubes (17 during June, 2 during July). H Reactor was shut down July 22 and replaced 58 process tubes.

B Reactor replaced 29 tubes and D Reactor 7 tubes (including 2 air channel tubes) on a scheduled basis during July. Tube replacement crews were utilized for Project CG-651 work at C Reactor.

d. Electric Power Scheduling

Production Scheduling participated in scheduling usage of interruptible power on three occasions during July when it was necessary to schedule eight-reactor water plant operation. Unscheduled outages cut the duration of interruptible power usage to about 20 percent of that scheduled.

e. Input Production Measurement

Area personnel at C, KE and KW Reactors determined that the method being used for measuring the heat removed in the thermal shield cooling water had been resulting in approximately one percent understatement of total heat generation. This situation was corrected on a current basis during July. No adjustment is being made in reactor and basin inventories.

f. Off-Plant Shipments

Three casks of material including fifty pieces of cobalt and two regular uranium slugs were shipped to ORNL during the month.

3. Operations Analysis

a. Production Calculations and SS Accountability

Further discussions of various aspects of the existing S.S. accountability procedures and production calculation methods were held. Consideration is being given to expansion of

this material into handbook form.

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b. Electricity Control

Data on typical area electrical loads were developed as an aid in determining operation scheduling during FY 1958 with the limited amount of electricity available. A second draft of an IPD procedure for control of electrical loads to prevent exceeding the firm power contract demand was developed and is being circulated for comments.

B. Computing and Machine Records

Tube-by-tube source data were processed to establish the current production and corrosion status for each tube for all reactors. Routine production data reports were issued to implement the scheduling, forecasting and S.S. accountability functions of the Production Operation. Charge-discharge and tube replacement information for each Reactor Operation was provided in accordance with production schedules. Production data were supplied to each Pile Physicist for reactivity evaluations, and to the Process Technology Operation for EDPM processing.

The basic data for the Quarterly Long-Range Production Forecast were processed utilizing new procedures and programs to take advantage of recent record and machine improvements. A reduction of thirty to forty percent in the time required to process the data was realized. Data for investigating the predictability of long-term reactivity cycles associated with normal uranium irradiations were included in the calculations.

Revised "Charge Card" forms were received through Central Stores for maintaining, in each reactor building, the record of each current process tube loading. These dual purpose forms provide both written records for in-plant reference, and punched card records which, in part, parallel and back-up the C & MR tube loading records.

The S.S. Accountability functions of C & MR were expanded to include machine computation of heat production in each type of fuel element for month-end reporting. The small, but significant, fraction of the total production associated with tube loading, containing two types of fuel elements is now assigned to the different element types by machine calculation.

The process tube corrosion calculations performed by C & MR were expanded to provide the additional tube corrosion data as outlined in document HW-49852, "Use of a Tube Power Effect in Calculating Process Tube Corrosion."

C. Reports, Statistics & SS Accountability

1. Reports & Statistics

a. Daily Reporting

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HW-51703

Routine processing of the Daily Production Report and the Daily Operations Report in both summary and complete forms was continued.

b. Monthly Reporting

The Combined Report of Production and Reactor Operations for June, 1957 was assembled and issued. Included were the production summary and six pages of statistics prepared by this office.

A Production Summary for July, with explanation for variance from forecast, was prepared for management on July 23, projecting production estimates and experience to month-end.

Special monthly report information was assembled for personnel of the AEC-HOO (Operations Division) summarizing plant operation and related statistics for June.

c. Production Statistics

The chart book depicting reactor production, time operated efficiency, and related statistics was maintained for IPD management.

The preparation of room 34 in 1704-H as a Central IPD Chart Room is 90 percent complete. Forty-two charts are being prepared for posting - 25 by this office, 9 by the Financial Operation, and 4 by the Employee Relations Operation. Background data for preparation of the charts are essentially complete, and the finished charts are about 50 percent drawn.

Other production statistics work performed during July included the following:

- (1) Production data, operating efficiencies, outage hours and tube replacement information were furnished the Product Cost and Budgets Operation.
- (2) Weekly reports showing process water flow and related reactor data were supplied to the Radiation Protection and Analytical Laboratories Operations, Hanford Laboratories Operation.
- (3) Information was supplied the Plant & Industrial Engineering Operation each morning showing which reactors were operating.
- (4) Power level, water flow and tube replacement data were given to the Process Engineering Operation, Fuels Preparation Department.
- (5) Tube leak data from 1951 to date were developed for the Production Forecasting and Scheduling Operation.
- (6) Reactor scram data following CG-558 outages were supplied to the Process Design Operation.

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2. S.S. Accountability

The final draft of IPD Advice 5.3.1, "Control of Source and Special Nuclear Materials," was submitted to all interested Operations for comments. These were being received at month-end.

Discussions were held with the 100 Areas S.S. Accountability Unit relative to their proposal for augmenting reactor input production source data.

Contact was maintained with the Contract Administration Operation in Relations & Utilities, regarding the progress of arrangements for the transfer of the 100 Areas S.S. Accountability Unit to the Production Operation of the Irradiation Processing Dept.

3. Miscellaneous Services

At the request of the Hanford Laboratories Operation, the proposed Hanford Classification Guide was given special review to determine its usefulness to the IP Dept. All affected Operations in the department participated in this analysis.

At the request of Relations & Utilities, the department's needs for personnel clearances in the "Atomic Weapons Data" category were determined. Only a very few clearances of this special type continued to be required.

The June Monthly Report of the Production Operation was consolidated and issued.

D. Essential Materials

Rail and truck shipments received in July were as follows:

Carload shipments for IP Dept.	187
Carload shipments for other Depts.	98
Truck shipments for IP Dept.	100
Total shipments received	385

In addition to the routine duties involved in the procurement and delivering of essential material, the following items were included in the group's activities during the month:

- 1) Coal shipments were resumed on July 16 after a suspension of two weeks caused by the annual miners' holiday. This date marked the initial shipments on Contract RO-45, with the Kemmerer Coal Co. of Kemmerer, Wyo. as the sole supplier.
- 2) Samples of liquid CO₂ were taken at the Gas Ice Corporations's Klickitat, Washington plant on July 2, and from the Finley, Washington plant on July 18. Samples were again taken at Finley on July 26. These samples were analyzed in the 300 Area laboratories to assure that CO₂ from these sources was meeting specifications before allowing shipments to continue from the Klickitat location, or initial shipments to be made from the new plant at Finley. The first carload of liquid CO₂ from the Finley plant was received by IPD on July 20.

C. A. Priode
C. A. Priode, Manager
Production Operation

REACTOR OPERATIONS
STATISTICS - PROCESSING
July 19 57

	B	C	D	DR	F	H	KE	KW	TOTAL										
Input Prod.-Pu (% of Forecast)	87.6	94.8	105.8	97.4	130.3	71.5	102.6	101.3	99.3										
Time Oper. Eff. (% Overall)	73.1	50.9	83.4	78.2	90.5	63.7	80.4	75.7	74.5										
No. of Reactor Outages & Hrs.	No.	Hrs.	No.	Hrs.	No.	Hrs.	No.	Hrs.	No.	Hrs.									
Scheduled	101.9	1	247.2	1	84.6	1	66.2	1	67.4	8	966.9								
Unscheduled																			
Scrams	12	35.0	5	3.7	3	2.4	1	1.1	2	3.9	5	30.0	1	0.5	5	8.5	35	85.7	
Other	3	63.0	4	113.9	1	36.2	5	73.9	-	-	2	4.4	2	69.3	3	104.6	19	464.7	
Total	15	199.9	10	365.1	5	123.2	7	162.4	3	70.8	8	269.9	5	145.5	9	180.5	62	1517.3	
Breakd'n of Reactor Otge Hrs.																			Total % of Time
Planned																			
Charge-Discharge	33.5	27.2	57.8	54.8	40.5	45.9	57.0	101.9	418.6	7.0									
Tube Replacement	48.8	0	17.1	1.0	0	101.3	0	3.5	171.7	2.9									
Project Work	0	223.9	0	0	0	58.7	0	0	282.6	4.7									
Production Test	0	(2)	32.2	0	4.5	0	11.0	0	47.7	0.8									
Maintenance	47.0	50.4	21.1	14.2	6.7	13.1	18.2	32.2	202.9	3.4									
Miscellaneous					1.1				1.1	0.1									
Sub-Total	129.3	333.7	96.0	70.0	52.8	219.0	86.2	137.6	1124.6	18.9									
Unplanned																			
Rupture Removal	25.7	17.9	11.3	(3)	76.5	(5)	11.3	0	58.8	3.4									
Leak Testing	20.0	1.5	3.5	8.2	11.9	19.4	0	0	64.5	1.1									
Maintenance	14.1	0.5	10.0	6.0	2.2	6.7	0	21.4	60.9	1.0									
Instru. & Circuitry	10.3	3.7	0.3	1.1	0.3	5.7	0	7.9	29.3	0.5									
Miscellaneous	0.5	7.8	2.1	0.6	3.6	7.8	0.5	13.6	36.5	0.6									
Sub-Total	70.6	31.4	27.2	92.4	18.0	50.9	59.3	42.9	392.7	6.6									
TOTAL	199.9	365.1	123.2	162.4	70.8	269.9	145.5	180.5	1517.3	25.5									
No. Slug Rupt.- All Types	1	4	1	4	0	0	2	0	12										
Tubes Installed-Repl. Progr.	29	(6)	7			60			96										
Type of Water Leaks																			
Tube	0	0	0	3	1	0	0	0	4										
Van Stone	0	1	1	0	1	0	0	0	3										

Remarks:

- (1) Continuation of June Tube Rpl. Outage
- (2) Includes 14.6 hrs. for rupture removal
- (3) Includes 27.6 hrs. for retubing previous rupture channels.
- (4) Includes 58.7 hrs. for CG-558 outage started 5/20/57
- (5) For retubing previous rupture channels
- (6) Correction: 19 tubes shown as replaced at C on the June Report- Should have been under D.

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REACTOR OPERATIONS STATISTICS - SLUG RUPTURES
JULY, 1957

Type Material	Tube No.	Type Rupture	Remov. Hrs.	Charge Date	Rupture Date	Act. Conc.	Lot No.	Removal Method			Remarks
								Quic.	Cig. Mach	Hyd. Jack	Tube & Piece
8" Reg.	2479-C	Charge Machine	9.2	6-6-57	7-2-57	148	PZ 299		X		
PT-IP-43A	3578-D	Slide Hot Spot	11.3	4-29-57	7-4-57	295	PT-IP-43A			X	
8" Reg.	1868-B	Unclassified	25.7	4-6-57	7-14-57	371	M-273			X	
8" Reg.	1587-DR	Slide Hot Spot	17.2.3	6-18-57	7-17-57	136	A-121		X		Leaker
8" Reg.	1464-C	Slide Hot Spgt	8.7	5-20-57	7-18-57	278	A-103			X	
8" Reg.	2372-KE	Slide Hot Spot	38.6	3-28-57	7-19-57	607	PT-IP-43A				PT-IP-43A
PT-IP-1A	1461-C	Unclassified	9.7	3-4-57	7-21-57	1226	11-66E		X		Solid E
PT-IP-1A	2663-C	Slide Hot Spot	13.0	3-31-57	7-24-57	1053	15-98E		X		Solid E
8" Reg.	3285-DR	Slide Hot Spot	9.6	6-18-57	7-28-57	207	Z-343			X	
8" Reg.	3272-DR	In Chute Gate	27.4.8	6-18-57	7-30-57	208	A-125		X		Leaker
8" Reg.	2747-KE	Split	20.2	4-18-57	7-30-57	461	K-595				
8" Reg.	2380-DR	Slide Hot Spot	12.2	6-18-57	7-31-57	213	A-125		X		Leaker
(1)	Includes additional time of 6.6 for rethbing on 7/29/57.										
(2)	Includes additional time of 2.0 for rethbing on 7/31/57.										
(3)	Run-to-rupture.										

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REACTOR OPERATIONS STATISTICS - POWER - SHEET 1

WATER FLOW DATA		100-B	100-C	100-D	100-DR	100-F	100-H	100-KE	100-KW	TOTAL
RIVER WATER (BLDG. 181)										
TO RESERVOIR	GPM AVG	82737		86425		74027	59780			302969
TO FILTER PLANT	GPM AVG	58700		57116				143400	148600	407816
(C, DR, K)										
TOTAL	GPM AVG	141437		143541		74027	59780	143400	148600	710785
TOTAL	MM GALS	6313.7		6407.7		3304.6	2668.6	6401.4	6633.5	31729.5
RESERVOIR WATER (BLDG. 182)										
TO FILTER PLANT	GPM AVG	66032		80441		70857	57300			
TO COND SYSTEM	GPM AVG	3600		5984		3170	2480			
TO EXPORT SYSTEM	GPM AVG	13105		-		-	-			
TO EXPORT SYSTEM	GPM NOR	13105		-		-	-			
TO EXPORT SYSTEM	MM GALS	584.9		-		-	-			584.9
FILTERED WATER (BLDG. 183)										
TO POWER HOUSE	GPM AVG	128		164		89	75	30	16	
TO PROCESS	GPM AVG	64200	57300	66100	62600	67652	56000	137200	138300	
TO DR	GPM AVG			6109						
TO F & S SYSTEM	GPM AVG	153		313		222	132		50	
PROCESS WATER (BLDG. 190)										
TO REACTOR	GPM AVG	60200	52400	65700	62200	67302	53600	136800	137900	636102
	GPM NOR	71200	85000	70400	70800	72824	70000	160700	163200	764124
TOTAL	MM GALS	2687.3	2339.1	2932.8	2776.6	3004.4	2392.7	6106.8	6155.8	28395.5
RIVER DATA										
ELEVATION (MSL.F.T.)	(MAX)	397.6		387.8		374.3	379.9		392.2	
	(MIN)	392.2		384.0		369.9	376.1		386.6	
	(AVG)	394.4		385.2		371.7	377.4		387.9	
TEMPERATURE	AVG °F	62		62.8		63.5	63.0		61.9	

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REACTOR OPERATIONS STATISTICS - POWER - SHEET 2

WATER TREATMENT DATA		100-B	100-C	100-D	100-DR	100-F	100-H	100-KE	100-KW	TOTAL
AT BLDG. 182 BLDG. 183	MM GALS	---		---		---	---			---
	MM GALS	2947.7	2620.4	3590.9	2549.7	3163.1	2557.9	6401.4	6633.5	30464.6
CHEMICAL CONSUMPTION										
	CHLORINE (BLDG. 182)	0		0		0	0			0
	(BLDG. 183)	21370	25385	35740	19120	31516	19750	58600	60200	271686
	AVG PPM	0.8	1.1	1.2	0.9	1.2	0.9	1.1	1.1	1.1
LIME	LBS	0	0	0	0	0	0			0
	AVG PPM	0	0	0	0	0	0			0
CAUSTIC	LBS							-	-	-
	AVG PPM							-	-	-
ALUM	LBS	174378	146811	228770	142400	241574	162450	416200	336900	1,849,483
	AVG PPM	7.1	6.7	7.6	6.7	9.2	7.6	7.8	6.1	7.3
Separan	LBS	158	86	580	194	475	200	400	0	2093
	AVG PPM	.006	.004	.019	.009	.018	.009	.008	-	.008
SULPHURIC ACID (AS 100%)	LBS	164000	145434	245157	176155	239425	145930	427000	495000	2,038,101
	AVG PPM	6.7	6.7	8.2	8.3	9.1	6.8	8.0	9.0	8.0
DICHROMATE	LBS	43600	38400	46700	41000	47768	32830	92900	93600	436798
PURGE MATERIAL CONSUMPTION										
SOLIDS	LBS	0	0	0	1300	0	0	0	0	1300

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REACTOR OPERATIONS - POWER STATISTICS - SHEET 3

ANALYTICAL DATA	100-B										100-KW			
	100-B	100-C	100-D	100-DR	100-F	100-H	100-KE	100-KW	100-KW	100-KW	100-KW	100-KW	100-KW	100-KW
RAW WATER														
FINISHED WATER														
STEAM DATA														
ELECTRICAL DATA														

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TOTAL GENERATED KW HRS.

1,601,600 1,556,800 3,158,400

REACTOR OPERATIONS STATISTICS - RADIATION MONITORING

July 1957

	B	C	D	DR	F	H	KE	KW	IPD Total
Special Work Permits Issued	58	68	13	23	30	87	17	11	307
Routine and Special Surveys	423	780	499	512	469	545	435	417	4080
Air Samples Taken	59	87	59	45	86	52	45	42	475
Hand Contamination Cases	0	0	1	0	0	1	1	5	8
Skin Contamination Cases	4	2	4	2	2	4	2	2	22
Contaminated Injuries	0	0	0	0	0	0	0	0	0
Vehicles Contaminated	1	1	2	2	1	1	0	0	8
No. of Cases of Personal Clothing Contamination	1	5	0	4	2	2	1	12	27
No. of Cases Contamination Spread Outside of Radiation Zones	0	2	2	4	1	0	1	5	15
No. of Employees for whom Dose Rates ≥ 6 Rads/hr. Were Established	0	0	0	3	1	0	13	2	19
Lapses of Control (Reactor Operation)	0	0	2	3	1	5	1-KER	1	13
No. of Hours Training Others	3	17	7	8	6	18	0	0	59
Attendance at Mtgs for Training Others	6	21	25	25	0	90	0	0	167
REACTOR EFFLUENT DATA									
No. of Effluent Calculations	93	93	120	126	81	127	85	74	
Ave. Beta Dose Rate (mrads/hr.)	9.6	7.0	9.3	9.1	6.5	14.2	11.1	15.8	
Ave. Gamma Dose Rate (mrads/hr.)	15.4	16.0	17.2	19.4	14.7	23.4	20.1	39.4	
Ave. Total Dose Rate (mrads/hr.)	36.5	30.2	26.5	27.5	21.2	37.6	31.3	55.2	
Ave. Integrated Dose in 24 hrs.	589	539	620	628	510.48	909.3	751	1325	
Max. Integrated Dose in 24 Hrs in 1957	1835	4300	2780	3202	1664.8	1840.8	4383	4598	

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FACILITIES ENGINEERING OPERATION
MONTHLY RECORD REPORT

JULY, 1957

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I. ORGANIZATION AND PERSONNEL

Responsibility

The responsibilities of the Facilities Engineering Operation remained unchanged during this period.

Personnel Statistics

	<u>June 30, 1957</u>		<u>July 30, 1957</u>		<u>Net Change</u>
	<u>Exempt</u>	<u>Other</u>	<u>Exempt</u>	<u>Other</u>	
Employees on Payroll	173	115	169	113	-6
Technical Graduates - (Rotational)		15		15	0
Technician Trainees		6		5	-1
Summer Employees		9		9	0

Following are changes since last report:

	<u>FEO</u>	<u>Tech. Grad. (Rot.)</u>	<u>Tech. Trainees</u>	<u>Summer Employees</u>
Payroll Additions	0	0	0	0
Transfers Into Operation	8	3	0	0
Transfers Out of Operation	11	3	1	0
Payroll Removals	3	0	0	0

General

EQUIPMENT DEVELOPMENT OPERATION

K. B. Gilbreath, a Technical Graduate - Rotational, transferred out on June 21, 1957.

PROJECT ENGINEERING OPERATION

G. A. Zietler, a Technical Graduate - Rotational, transferred out on July 1, 1957.

J. T. Lloyd transferred to Hanford Laboratories Operation on July 1, 1957.

PROCESS DESIGN OPERATION

J. E. Hanson, a Technical Graduate - Rotational, transferred out on June 1, 1957.

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PLANT AND INDUSTRIAL ENGINEERING OPERATION

J. C. Dahlin terminated to accept employment elsewhere on July 12, 1957.
W. G. Ruff, a Technical Graduate - Rotational, transferred in on July 1, 1957.
D. B. Hagen transferred to Chemical Processing Department on July 1, 1957.
B. D. Howard, a Technician Trainee, transferred out on June 17, 1957.
P. A. Crosetti, a Technical Graduate - Rotational, transferred in on July 1, 1957.
F. E. Young, a Technical Graduate - Rotational, transferred in on July 8, 1957.

ENGINEERING AUXILIARIES OPERATION

K. W. Greager transferred to "H" Reactor Operation on July 1, 1957.
W. C. Ponder transferred to Relations and Utilities on July 1, 1957.

PROJECT MAINTENANCE

F. R. Mattison transferred from Hanford Laboratories Operation on July 1, 1957.
C. G. Potter transferred from Chemical Processing Department on June 24, 1957.
W. E. Setchfield transferred from Central Maintenance on July 1, 1957.
J. L. Dion transferred from "H" Reactor on July 15, 1957.
D. M. Reinhardt transferred from "D" Reactor on July 15, 1957.
G. H. Harden transferred from "H" Reactor on July 29, 1957.
O. J. Bethel transferred from "F" Reactor on July 29, 1957.
H. R. Seefeldt transferred from "K" Reactor on July 29, 1957.
C. C. Culverhouse was removed on ROF on June 24, 1957.
R. J. Lawrence transferred to "D" Reactor on July 1, 1957.
C. A. Grimm transferred to "B" Reactor on July 1, 1957.
M. T. Sepich terminated on July 19, 1957.
N. A. Vaught transferred to "H" Reactor on July 15, 1957.
R. L. Ingram transferred to "D" Reactor on July 15, 1957.
W. J. Gurtisen transferred to "H" Reactor on July 29, 1957.
A. L. Mottner transferred to "F" Reactor on July 29, 1957.
L. J. Livingston transferred to "K" Reactor on July 29, 1957.

Trips and Visitations

M. G. Patrick visited Washington, D. C. on July 10 and 11 for a meeting with AEC personnel in regard to Project AEC-160. On July 12, Mr. Patrick visited the Battelle Memorial Institute in Columbus, Ohio, to attend a symposium on gas-cooled loops and to present the status of AEC-160.

W. J. Mundt visited Pasadena Power and Light, Pasadena, California, to survey a steam turbine and associated equipment for possible purchase and removal to HAP0 for use in a proposed pump testing facility.

K. H. James of the Metalizing Engineering Corporation, Seattle, conducted a clinic in 100-H Machine Shop for machinists.

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Mr. Estill of the Fisher Governor Company, and V. R. Miller, West Coast representative for Fisher Governor Company, visited HAPO on July 22, 23, and 24 to conduct a maintenance clinic on control valves and other Fisher products utilized in IPD.

C. E. Frantz and J. E. Robb visited two companies in Yakima, Washington, on July 23, 1957: Nair and Sons, to discuss fabrication of a charging machine cover; and Edmundson Machine Works, to evaluate their ability to machine parts which are now in the design stage.

Training

The following Training courses were attended by FEO personnel during July:

<u>Name of Training Course</u>	<u>Number of FEO Personnel Attending</u>
"Labor Management Relations"	2
"G. E. Salary Plan"	6
"Understanding People"	19

E. W. Baker presented an orientation lecture and film on Productive Maintenance to interested exempt personnel.

Training sessions on the Fisher Automatic Controllers were attended by nine Project Maintenance journeymen.

A welder training program has been developed by the CEO Welding School and IPD Maintenance forces.

Safety

There were six medical treatment injuries sustained by Facilities Engineering Operation during the month.

Security Experience

There was one security violation by Facilities Engineering Operation during the month.

Radiation Experience

No incidents exceeding the maximum permissible limit were reported.

II. ACHIEVEMENT

A. Process Design Operation

Existing Reactor Studies

Analytical studies in support of the K Water Plant Modification development program were performed during the month. These included

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evaluation of flywheel adequacy and investigation of process economics for higher power operation at the K reactors. Scheduling problems associated with process pump set modifications were studied, as were cost and schedule factors involved in vendor performance of impeller modification development work. A decision has not yet been reached as to the best method of accomplishing the necessary development work.

Request has been made to Instrument Development for establishment of a Research and Development program item for the development and testing of a temperature fuse to permit automatic operation of the proposed Last Ditch Reactor Control System. In support of this item, heat transfer calculations were made of the temperature behavior of key reactor components following loss of cooling water.

A preliminary report on post-558 reactor vibration problems has been prepared. Principal items of immediate concern are effects of vibration on panellit gage and rear face piping. It will require a more refined vibration survey to determine if any serious results may be expected from reactor vibration, but no further studies are planned at this time unless requested by Reactor Operations.

The final report on the results of power recovery studies performed for existing reactors during the past year has been issued. Report of a separate study regarding conversion of an existing reactor to organic cooling with subsequent power recovery has been prepared in draft form.

Additional study was conducted of a full scale pump test stand for installation at Hanford. A survey was made of a potentially applicable driving unit which, being used, was low in cost and immediately available. An estimate was made of the test stand cost, using such a driving unit. Even with the cheap drive, the total cost was too high (\$390,000) to warrant further consideration at this time, so work has been suspended.

New Reactor Studies

Design bases for a pressurized water cooled Improved Production Reactor concept are being reviewed and brought up to date. A capital cost evaluation and unit product cost estimate will be made to serve as a base case to which more advanced concepts can be compared. Other Improved Production Reactor design development work during the month included capital cost formulation studies, advanced building design, high temperature shielding tests, and advanced coolant manifolding studies.

Some additional heat transfer and process analysis work was done on the fluidized bed reactor to incorporate additional basic fluidization and thermal property data.

A review was made of latest data pertinent to evaluation of carbon steel for use in pressurized water reactor cooling systems. A summary of the information obtained is in draft form.

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Assistance was given in developing a method of calculating maximum flow from a pigtail rupture in the Plutonium Recycle Program Reactor. Pressure drops were calculated for the heat exchanger and condenser systems, as well as for the steam disposal lines. Criteria for the various coolant circuits were reviewed, and those for the reactor shielding were completed and issued for final review.

Authorization was received from the AEC to proceed on a study of the gas-cooled graphite reactor concept.

Significant Reports Issued

<u>Number</u>	<u>Title</u>	<u>Author</u>
HW-45471	"Economic Study of Power Recovery from Hanford Reactors Waste Heat", June 4, 1957.	E.L. Etheridge W.J. Mundt
HW-45684	"Chapter 16 - Reactor Handbook, Section 16.5", May 9, 1957.	G.L. Locke, et al
HW-50204	"K Water Plant Expansion", May 27, 1957.	D.L. Condotta
HW-51105-RD	"Air Operated Reactor Safety Rods", June 26, 1957. (Confidential-Undocumented)	G.E. Wade
HW-51247	"Report of Trip to Los Angeles, California, June 17 and 18, 1957", July 3, 1957.	H.W. Heacock

B. Equipment Development OperationGeneral

In connection with the charge-discharge program, work is being performed on the development of an adequate gamma monitor, the charging machine, elevator modifications, and a TV installation. On the charging machine, electrical debugging is under way at the test site on the third floor of the 108-D Building. The charging machine has been operated successfully through two complete charging cycles under manual control.

During the month a prototype vertical rod system was installed in the test tower and a substantial portion of testing completed to prove the design for Project CG-708, "Installation of Additional Vertical Safety Rods for KE and KW". With the application of 100 psi of air to the chamber at the top of the cylinder, the rod can be inserted into the system in 0.7 of a second compared to 1.8 seconds for a gravity fall. Other testing data, including time-space displacement curves, were obtained, and a new prototype limit and indicating switch was demonstrated.

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Instrument Development support of Zone Temperature Monitoring, Project CG-666, centered on the resistance temperature detectors and evaluation of the Panellit controller system. Many difficulties were revealed in the first Panellit controller prototype including lack of required accuracy and temperature-sensitivity of circuits and components, but none of them are considered so serious that they cannot be worked out.

An electronic control unit has been scoped, built, and laboratory-tested which is capable of sensing irradiated third safety system ball activity down to one mr. per hour at the ball surface. This is a factor of 20 below any sensing instrumentation previously available. This device will be included in the scope of Project CG-741, "Renovation of the Ball 3X System, 105-C", coupled with a mechanical device for diverting hot balls.

In the poison spline program, the Arcoflex seal has been re-designed to increase its strength and has been tested at pressures up to 4000 psi. The water eduction system for chopped spline disposal at K Area passed its first prototype test, and parts have been ordered for the final prototype.

The contract for scope design (Phase I) and fabrication (Phase II) of a prototype rear face manipulator has been approved at HAPO and sent to General Mills, Inc. for their approval.

During the CG-651 shutdown, it was possible to run into the rear face, four of the eight bundles of prototype metal-sheathed thermocouples (12 per bundle). Five thermocouples were inserted in ball valve elbows for tube temperature monitoring, replacing five of the regular-type thermocouples which had failed.

To improve the electrical controls used in the Ball 3X equipment and thus reduce the frequency of inadvertant ball drops, new solenoids for use on the hopper doors are being developed. Specifications for a single-frame, double-wound solenoid have been devised. This solenoid will permit use of the 115-volt supply, which is less subject to failure than the low voltage system being used. Assistance in this development has been enlisted from the General Purpose Control Department of General Electric Company.

X-ray photographs of slug cocking indicate a direct relationship between Panellit pressure and extent of slug cocking. Panellit pressure increases up to 41 psi were noted during the testing. Since this effect can be reproduced, additional studies may determine if cocked slugs can be located in process tubes through panellit pressure increases, and whether cocking results in a higher frequency of ruptured slugs.

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Significant Reports Issued

<u>Number</u>	<u>Title</u>	<u>Author</u>
HW-50768	"Design Criteria - Renovation of Ball 3X System, 105-C - Project CG-741", June 7, 1957.	J.P. Cooke
HW-51036	"Ball 3-X System Corrosion Inhibition", July 10, 1957.	H.F. Jensen
HW-51232	"Status Report - 100-C Graphite Thermo-couple Stringer Development", July 3, 1957.	T.D. Dow
HW-51244	"'C' Metal Out of Pile Charging and Flow Tests in 'C' Pile Tubes", July 3, 1957.	P.B. McCarthy
HW-51279	"Condition of VSR Channel No. 20-D Reactor", July 29, 1957.	W.E. Cawley
None	"Loop Joint and Gasket Test - Design Test Request No. 1706-KER-2", July 24, 1957.	J.R. Spink

C. Plant and Industrial Engineering Operation

During the month 95 suggestions were received, and evaluations were completed on 141 suggestions. At month end the backlog had been reduced to 297 suggestions awaiting evaluation.

The high mortality of Foxboro Dewcel elements is being investigated. Contributing causes located to date are: (1) Condensate dripping on the measuring element from the gas inlet of the dewcel, (2) Plugged or restricted sample gas flows, (3) Insufficient drainage of condensate from Dewcel, (4) Operation of deep freeze unit at 20° F. before sample lines are dry, (5) Performance of the current ballast indicates excessive load on numerous heater windings. The system requires careful attention during start-up of operation.

An inspection of the completed repair work on the intake chute in the KE-B retention basin resulted in a recommendation for additional bracing of the intake chutes. Sketches of the proposed bracing were discussed with K Maintenance Operations and the changes have been incorporated in their chute repair program for all chutes including KE-B.

The 107-C tank bottom was inspected on July 8 and two holes were drilled to determine if tank thickness was sufficient for repair welds. At these two locations, the plate was almost three-eighths of an inch thick and in good condition. Recommendations

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were made for repair of the tank bottom. Assistance was provided in scoping a project proposal for filling the 107-C crib with rock to prevent contamination spread.

Repairs to the 107-H far effluent line leak at the basin intake were completed July 8, 1957, and the line returned to use. Excavation of the near line has revealed much less severe wall cracking, and recommended repairs include only a single Dresser coupling installation and grouting of leaks.

The renovation program of the 105-DR Building foundation is underway and the repair of the crack in the far downcomer was completed. The effluent line was inspected on July 15, 1957, to a point beyond the second elbow but no visible breaks or cracks in the pipe were discovered. The absence of an inside weld on two joints may be the source of the leakage seen earlier at the anchor when the far downcomer was in use.

Toward the end of June it became apparent that the firm power quantity contracted from BPA did not provide the test power needed in 100-K for a four month period. Through negotiations 15,000 kw of interruptible power was obtained for a two month period. Further negotiations are continuing to cover the remaining two months.

Significant Reports Issued

<u>Number</u>	<u>Title</u>	<u>Author</u>
Not Documented	"Trip Report - Lighting Conference, Cleveland, Ohio", June 26, 1957.	M.L.Faught
Not Documented	"Craft Training", July 10, 1957.	T.M. Clement
Not Documented	"Spare Parts Program and Status", July 2, 1957.	T.M. Clement
Not Documented	"Unirradiated Slug Handling, Study 57-11", July 26, 1957.	J.E. Fouts
Not Documented	"1717-H Shop Layout, Study 57-18 (A)", July 11, 1957.	J.W. Helm
Not Documented	"Work Simplification Program VI, Study 57-13 (A)", July 16, 1957.	E.C. Arbuckle
Not Documented	"Scope Letter - 107-C Crib Rock-fill", July 5, 1957.	J.P. Corley
Not Documented	"Recommended Report on the Alleviation of 105-DR Building Settling", July 21, 1957.	L.B. Brinkman

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D. Project Engineering Operation

General

Project engineering is being performed on a total of 61 assignments; 38 are active projects or engineering studies and 23 are projects upon which no substantial progress was made during the month. Inspection services were performed on 16 different assignments; five of them being completed during the month and final inspection reports issued.

Construction Projects

Construction Completion Status of major process facilities at the end of July 1957 was as follows:

<u>Project Number</u>	<u>Title</u>	<u>Per Cent Complete</u>	
		<u>Scheduled*</u>	<u>Actual</u>
CG-558-I	Reactor Plant Modifications	99	99
CG-558-II	Reactor Plant Modifications	97	99
CG-600	100-C Alterations	100	48
CG-654	Advance Design, Reactor Plant	--	99

* Per Certified Schedule or Directive Completion Date.

CA-431-C 105-C Completion

The removal and installation of five horizontal control rods was completed during the CG-651 outage of July 8 to July 16.

CG-558 Reactor Plant Modifications for Increased Production

Phase I work for 100-B, D, and DR continued in clean-up and removal of the old electric units. One set of new casing wear rings was installed.

DeLaval Steam Turbine Company's letter of May 24 in which corrosive water was claimed to have been the cause of 183 Building pump cavitation has been answered and information given to refute this allegation. The answer also proposed that the modifications suggested by them be performed by HAPO, and if the correction brought the pumps into full compliance with the specifications, that the cost of the correction be at their expense.

Because of failure of toggle valves installed in the Pressure Monitoring System, replacement of spools will be necessary. It is expected that the vendor will bear the expense of the spools.

Because of the vapor lock problem in the 1608-F discharge piping, arrangements were made to relocate the tie-in to the effluent line during a tube outage tentatively planned for September.

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Investigation of the 183-F pump cavitation continued, with metallurgical tests indicating definitely that the damage is mechanical rather than chemical in nature. Data on pump dimensions indicate unusually great variations from design, but none were felt to be sufficient to cause the observed cavitation.

A trip-out test was made at 100-H to verify the effect of additional time delay relays, installed to prevent feed-back of flywheel energy into the power supply circuits. Results were satisfactory.

CG-600 100-C Alterations

After approximately 60 days of operation, the Byron-Jackson pump installed in position No. 12 in 190-C was opened during the week of July 29. Byron-Jackson engineers were present to examine the unit. At the rate of cavitation erosion indicated by the first 60 days of operation, it was the consensus that the life of the impeller would be less than one year. A project proposal revision is in preparation requesting more funds and an extension of time for solution of the cavitation problem. Since it is expected that a new design for an impeller must be developed and tested before satisfactory impellers can be manufactured, an extension of time to approximately June 1959 is being considered.

Effluent modifications and toggle valve installations were completed during the week of July 8.

CG-642 Continuous Charge-Discharge Equipment, C Reactor

Two CG-651 rear ball valves were modified to permit on-pile testing of two alternate ball valve actuator designs of interest for CG-642.

CG-651 Continuous Charge-Discharge Equipment, C Pile Demonstration Unit

The outage started on July 8, 1957, as scheduled. One hundred and eleven tubes were modified and all scheduled work was completed. Some delay was experienced at the start of the outage due to difficulty in removing gunbarrel flanges. The difficulty was corrected by devising improved powered tools. To facilitate the installation of ball valve adapters on the rear face, the threads in the adapter had to be chased to provide more clearance. A delay in the outage schedule of six shifts was incurred during the correction of these problems. On Friday, June 12, a five-shift extension to the outage schedule was granted which allowed completion of the work. At the end of the outage, five tubes were satisfactorily flush-discharged through the rear face ball valves.

CG-665 Metal Loading Facilities, 100-B, D, DR, F, and H Areas

Security clearance for the vendor's representative was obtained during the week of July 22 to permit his evaluation of the failure of the equipment to meet performance specifications.

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CG-666 Zone Temperature Monitoring, 100-B, C, D, DR, F, and H Areas

During the CG-651 outage at 105-C, some of the duct work was installed. Inspection of the resistance temperature detectors by Equipment Development has shown severe stem abrasion after six to nine months use, and some circuit failure has resulted. An adapter nut was fabricated to provide additional support for the stem, and tests to date indicate that these will minimize the stem wear. A number of these new devices were installed on the piles for operational test.

CG-708 Installation of Additional VSR's in KE and KW

Washington representatives of the AEC reviewed this job on July 23, 1957, in regard to its performance by plant forces, and since then approval by HOO-AEC Labor Standards Board has been received.

AEC-160 Recirculating Gas Loop

At a meeting in Washington, D. C. on July 10 and 11 it was decided that work on this project would proceed with the plan to design the loop for use with either nitrogen or helium. Additional funds to incorporate helium use in the design and to cover the basic cost increase previously reported have not been authorized to date.

E. Principal Engineers

A central VSR in 100-KW was so badly bent that it had to be removed by a winch. Examination indicates its bent condition was due to mechanical rather than thermal causes. Recommendation was made that the rod be cold-straightened and observed for subsequent warp during operation.

An unbalanced bus arrangement at 151-B Substation has resulted in an overload condition of No. 3 main transformer bank. The changes in operating conditions resulting from Project CG-558, and perhaps Project CG-600, have contributed to this condition. The following measures are being undertaken: (a) Electrical Utilities has arranged for sequential tripping of breakers with transformers temporarily in parallel to relieve No. 3 bank, as an immediate short-term remedy to avoid production curtailment during the summer season. (b) A study has been made of bus arrangements and two synchronous motors can be moved to other buses at an estimated cost of \$37,000.

The Principal Engineer accompanied W. E. Johnson to Washington, D. C. on the occasion of his testimony before the Legislation Subcommittee of the Joint Committee on Atomic Energy, June 24, 1957. As a result of the hearings, additional studies were undertaken by Process Design Operation to determine: (1) the additional costs in a new plutonium-production reactor plant necessitated by the requirement that it have a recirculating rather than a once-through cooling water system, and (2) the unit cost from a plutonium-production reactor utilizing zirconium-clad cluster fuel elements operating at 2000 MWD/T.

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Significant Reports Issued

<u>Number</u>	<u>Title</u>	<u>Author</u>
HW-51236	"Data on Dual-Purpose Reactors, Testimony Before JCAE on June 24, 1957".	W.J. Dowis
HW-50137	"Reconciliation of Economics in Documents on Dual-Purpose Reactors, September 25, 1956, to June 16, 1957, and Testimony of June 24, 1957".	W.J. Dowis

F. Engineering Auxiliaries Operation

Project Proposals Submitted to the Atomic Energy Commission

CG-705, Revision 1, Rod Cooling Water Instrumentation Modification
CG-707, Revision 1, Improvements to Reactor Nuclear Instrumentation
CG-768, Restoration of Vertical Safety Rods, 100-DR and H

Project Proposals Approved by the Atomic Energy Commission

CG-651, Revision 2, Continuous Charge-Discharge, C Pile Demonstration Unit
CG-684, Revision 2, Adequate Fresh Air Systems, 105-B, D, DR, F, and H Buildings
CG-738, Increased 440 Volt Electrical Service, 189-D Building
CA-762, Graveled Surface Roof Repairs, 100-B, C, D, DR, F, and H Areas

Project Proposal Requests Received

CG-600, Revision 3, 100-C Alterations
CG-761, Revision 1, Reactor Organic Coolant and Equipment Test Facility
CG-768, Restoration of Vertical Safety Rods, 100-DR and H
Modification of 1706-KER Carbon-Steel Loop
1706-KE Acid Facility

Nine jobs were approved by HOO-AEC Labor Standards Board for assignment to plant forces. This includes six FY-1958 budgeted maintenance jobs.

Drafts of HOO-AEC Supplements to Chapters 5401 and 6106 were received. A joint task force of HOO-AEC and GE representatives was organized to review them and make mutually agreeable revisions.

Significant Reports Issued

<u>Number</u>	<u>Title</u>	<u>Author</u>
HW-24800-103	"Volume II, Completion Report Project CA-512, 100-K Water Plants", June 30, 1957.	G.R. Hale

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G. Project Maintenance Operation

Work Order Data

	<u>June</u>	<u>July</u>
Active Work Orders	64	69
Unexpended Labor Dollars	\$359,500	\$290,961

Sufficient Project Maintenance personnel was placed on shift during the installation of Charge-Discharge equipment at 105-C to minimize overtime expenditures.

The installation of the Gamma Monitoring System at 105-KE and KW has been completed except for instrumentation. This is one of the exceptions on Project CA-512, 100-K Area Facilities.

W. W. Windsor

Manager

Facilities Engineering Operation

FACILITIES ENGINEERING OPERATIONMONTHLY REPORT OF INVENTIONS OR DISCOVERIES

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

INVENTORSUBJECTREPORT DATE

W. E. Cawley

Method of Constructing Pressure Vessels for
Extremely High Pressures

July 8, 1957

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W W Weberman
Manager
Facilities Engineering Operation

EMPLOYEE RELATIONS OPERATION
July 1957

PERSONNEL DEVELOPMENT AND PLACEMENT OPERATION

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Organization and Personnel

There was no change in the organizational structure nor of functions and responsibilities of the Operation during the month. The status of the force at the beginning of the month and at the end of the month was as follows:

	<u>Beginning of Month</u>	<u>End of Month</u>
Exempt	6	6
Non-exempt	<u>18</u>	<u>17</u>
Total	24	23

No medical treatment injuries and no security violations occurred. Eight hours of overtime were worked.

Personnel Development

A system to classify and code 190 exempt positions in the Department has been developed. When complete, it will serve as a method of locating positions that match an individual's qualifications. This is the reverse of our existing personnel register procedure which locates candidates for a position. It is intended to be used in planning transfers for developmental purposes.

Six copies of a revised instruction manual for the IPD Exempt Manpower Register are in preparation. The revision resulted from the five major changes made to the system as reported last month.

A special class of Dr. Conant's course "Understanding People" has been arranged and scheduled for the Department's Level III Managers.

Progress has been made towards the establishment of several Engineering Services courses. Those being immediately investigated are "Creative Approach Seminar" and "Applied Creativity".

In conjunction with the "HAPO Orientation Week" for 92 summer and new professional employees, an all-day orientation tour of the operating areas was completed. A total of about 60 exempt employees representing all levels of IPD management participated in some phase of one or more of the tours conducted in each of the five operating areas. Thirty-five of the people were College Juniors or College Graduate Students hired for summer employment.

Three Tech. Grads. from the program were assigned to the Department. Eleven of the nineteen Tech. Grads. placed on rotational assignment in the Department during this period are new employees on their first rotation. The present total of 65 in IPD is believed to be the peak for this year. The status of assignments at month-end by Operation is shown in the following table:

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<u>Assignment</u>	<u>No. of Transf.</u>		<u>No. Present At End of Mo.</u>	<u>No. Off-Program Assignments to IPD</u>	
	<u>Out</u>	<u>In</u>		<u>This Mo.</u>	<u>Since 1/1/57</u>
Research & Engrg.	4	9	26	1	7
Facilities Engrg.	1	4	21	0	5
B-C Reactor	0	1	4	0	0
D-DR Reactor	1	3	4	1	2
F-Reactor	0	0	2	0	0
H-Reactor	1	1	3	1	2
K-Reactor	0	1	5	0	2
	<u>7</u>	<u>19</u>	<u>65</u>	<u>3</u>	<u>18</u>

Exempt employee training classes progressed without incident. The list of subjects offered with current month and year-to-date attendance is shown below:

	<u>This Month</u>	<u>Last Month</u>	<u>Year-to-Date</u>
Management Orientation	0	0	22
GE Salary Plan and Its Administration in the IPD	15	0	42
Financial Operation Orientation	0	17	29
IPD Radiation Protection Program	0	8	20
Data Processing	1	6	32
Effective Business Writing	0	13	24
GE Employee Benefit Plans	0	9	52
Labor-Management Relations	11	15	68
Process Orientation	0	0	36
Safety and Fire Prevention	0	-	18
Time Card Procedures	0	0	100
First Aid	0	0	0
Understanding People	54	0	54

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The Non-exempt personnel development program continued satisfactorily. An indication of program activity and progress is shown below:

	<u>This Month</u>	<u>Year-to-Date</u>
Number of Forms Distributed	145	924
Number of Forms Returned	110	682

In the Supervisory Selection Program, no new evaluations were initiated due to the pending leave-of-absence of the program administrator. Seven re-evaluations were performed, however. The status of this program at month end is shown in the following table:

	<u>This Month</u>	<u>Last Month</u>	<u>Year-to-Date</u>
New Evaluations Completed	0	4	12
Evaluations Underway but Incomplete	0	6	
Re-evaluations Performed	7	6	90
Re-evaluations Underway but Incomplete	0	5	
Re-evaluations Outstanding	0	1	
Nominations Outstanding	36	36	
Appointments from the Program	0	1	3

Technical Personnel Placement

PhD Activity

Six PhD candidates were interviewed by IPD representatives this month, resulting in three employment offers.

<u>BS/MS Recruitment (Experienced)</u>	<u>July</u>	<u>June</u>
Active cases centralized by IPD	6	5
Candidates centralized by other Departments	4	7
Offer letters processed	0	2
IPD offers accepted	0	1
IPD offers rejected	1	0
Offers - candidates considering	1	2
New hires - IPD	0	0

Active participation in Experienced BS/MS recruiting remained curtailed with primary emphasis given to the placement of people on the availability list. An offer to a Service Reactivate made four months ago was finally rejected.

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<u>Transfers and Terminations</u>	<u>July</u>	<u>June</u>
Active IPD cases	17	18
Other HAPO Departments (IPD interest)	4	4
Transfers, other Departments to IPD	3	3
Transfers from IPD to other Departments	3	2
IPD transfers to other GE sites	0	0
Terminations	1	4

There was one termination, a retirement from F Reactor. Three Tech. Grads. transferred from the program to IPD. Three transfers from IPD to other Departments included two people on the availability list in the Facilities Engineering Operation.

There was one new transfer referral for processing within the Department while two previous referrals were resolved. The number of exempt employees in available status was reduced to ten. Eight of these have received their 90-day ROF notices. Outside GE contacts for these people, though accelerated during the past two weeks, have not been productive. Through contacts with other HAPO Departments, three possible transfers were pending at month end.

Military Reactivates

One Military Reactivate turned down an offer extended jointly with the Hanford Laboratories Operation and another accepted our re-employment offer.

Employment

Thirty-two service pins were awarded. Twenty-one employees received attendance awards. As of 7-15-57, thirty-five transfer requests were active (7 non-unit and 28 unit). Thirty-one additions to payroll were made and twenty-six employees were removed from the roll. Eight openings existed at the end of the report period with one commitment made and one requisition on hold status.

Service Recognition Plan

<u>Years of Service</u>	<u>Number of Awards</u>	
	<u>This Month</u>	<u>9-1-56 to Date</u>
5 years	15	176
10 years	17	155
15 years	0	2

Attendance Recognition Plan

<u>Years of Perfect Attendance</u>	<u>Number of Awards</u>	
	<u>This Month</u>	<u>9-1-56 to Date</u>
1	1	108
2	5	106
3	4	74
4	6	54
5	3	48
6	2	22
7	0	10
	<u>21</u>	<u>422</u>

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Requests for Transfer

	<u>Non-Unit</u>	<u>Unit</u>	<u>Total</u>
On Hand 6-15-57	8	28	36
New Requests Received	1	0	1
Transfers Completed	1	0	1
Requests Cancelled	1	0	1
Interviews Conducted	0	0	0
Requests on Hand 7-15-57	7	28	35

Personnel Changes - 6-16-57 to 7-15-57

Additions to Payroll:

9-1-56 to 7-15-57

New Hires	5	25
Re-engaged	0	1
Reactivates	5	50
Transfers	17	155
Re-hires	<u>4</u>	<u>16</u>
	31	247

Removals from Payroll:

Deaths	0	3
Retirements	3	16
Terminations	7	96
Deactivates	9	68
Transfers	6	70
Lack of Work	1	1
Discharged	<u>0</u>	<u>1</u>
	26	255

Requisitions

Number of Openings as of 6-15-57	7
Additional Openings 6-15-57 to 7-15-57	13
Openings Cancelled	1
Number of Openings Filled	11
Number of Openings as of 7-15-57	8 *

* One commitment and one on hold.

Disciplinary Action

	<u>July</u>	<u>9-1-56 to 7-15-57</u>
Employee Contacts Received	6	20
Warning Notices Received	0	5
Discharge Notices Received	1	2
Suspension Without Pay Cases	<u>0</u>	<u>0</u>
	7	27

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Mail and Duplicating

Available space in 1716-H building is now being considered as a possible location for mail and duplicating facilities. It appears that the cost of renovating space in this building would be materially lower than similar expense involved in creating office space in 190-H. A cost study is being prepared by Facilities Engineering to determine the feasibility of altering a portion of 1716-H to fit mail and duplicating requirements.

The volume of mail and duplicating work requiring priority treatment was quite high during July. As an example: two "Union Relations Bulletins", one "Management News Bulletin", one "Memo From The General Manager" and four IPD Advices were duplicated, addressographed and distributed within one work day. In addition, addressograph service was provided during this same period in preparing envelopes for mailing "Employee Compensation" material.

Mail and Addressograph

A priority mail-handling procedure designed to facilitate rapid distribution of the bulletin, "Memo From The General Manager" was developed. The procedure will permit reproduction of 2400 such bulletins and delivery to all 100-area badge-houses within a two hour period, when necessary.

During July, the General Electric Plant at Ithaca, New York requested information concerning mail-handling equipment used within IPD. Specifications and other information relative to operating experience were furnished.

Statistics

	<u>July</u>	<u>June</u>
Pieces of registered delivery mail	1,412	1,298
Pieces of postal mail	1,100	900
Pieces of regular mail	722,163	654,194
Number of addressograph orders handled	49	40
Number of addressograph impressions	21,835	19,348

Duplicating

Xerography equipment was obtained from Relations and Utilities Office Equipment and installed in the 1720-K duplicating office. All IPD duplicating facilities are now equipped to do photo-transfer work of this nature.

Top Secret clearances were again requested for duplicating employees assigned to 100-H Area. When approved, these clearances will permit greater speed in reproduction of certain classified data which presently must be carried to 700 Area and back by courier.

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Statistics

	<u>100-H</u>	<u>J U L Y</u> <u>100-D</u>	<u>100-K</u>	<u>Total</u>	<u>JUNE</u> <u>Total</u>
<u>Off-Set</u>					
Orders Received	608	162	241	996	1,160
Orders Completed	608	174	240	1,022	1,203
Orders on Hand	0	0	0	0	3
Xerox Masters Made	322	196	68	586	606
Total Masters Handled	2,590	527	682	3,799	4,725
No. Copies Duplicated	213,495	19,274	31,450	264,219	275,721

Verifax

Orders Received	30	43
Orders Completed	30	43
Orders on Hand	0	0
Total Masters Handled	833	666
No. Copies Duplicated	1,178	2,756

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DECLASSIFIEDCOMMUNICATION

Mass communication activities included the publication of 8 Management NEWS Bulletins and six Union Relations Information bulletins, and distribution of one health bulletin and four issues of Management Information for Foremen and Supervisors. In addition, one priority message was initiated during the month.

Two new communication devices were begun during July. The first issue of "Round Table Guide" was distributed to approximately 100 first line supervisors who had requested it. Two issues of a "Memo from the General Manager", signed by the General Manager, were offered to all employees through the five 100 area main badge houses.

An orientation booklet on radiation protection at Hanford entitled, "Radiation Protection at Hanford," was developed jointly with the Chemical Processing Department. The booklet will be distributed to all new area employees.

Organization and Policy Guide 8.7, "Issuance of Official Correspondence and Documents", was issued to implement HAPO OPG 1.5 on the same subject.

GE NEWS coverage included the usual attendance award publicity, retirements, safety promotions. In addition, a short feature on the disaster training program appeared in a July issue.

An indication of the extent to which the GE NEWS is utilized as a communication medium may be obtained from the following tabulations:

	<u>This Month</u>	<u>Last Month</u>	<u>Year to Date</u>
Photos			
No. Published	11	24	150
Column Inches	108	235	1568
Text - Column Inches	12	36	221
TOTAL - Column Inches	120	271	1789

One abstract, four papers and one speech were processed for Public Relations review and approval during July:

Abstract - "Estimation of the Thermal Neutron Flux in Special Irradiations at Hanford," Willis E. Fry

Papers - "Moderator Placement Problems in Large Graphite Reactors," D. Marinos

"The Effect of Flat Rate on Domestic Electric Power Consumption," F. J. Mollerus

"Mechanical Component Design Features of the Physical Constants Testing Reactor," W. J. Morris

"Accelerated Reactor Safety Rods," G. E. Wade

Speech - "Silence is Suicide," E. F. Fitzmaurice

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UNION RELATIONS

The Bureau of Labor Statistics Cost-of-Living Index for June 15 reached a new high of 120.2. On the basis of our cost-of-living formula, non-exempt employees will be entitled to a 1.77% increase in base rates to be effective July 29.

On July 5, 1957 the Company submitted its brief to the National Labor Relations Board for the 1706 KE-KER joint petition case. As reported last month, this case was the subject of a hearing on June 4 conducted by a Field Examiner of the NLRB. It is anticipated that the Board's decision will be given in about four weeks.

During July, the HAMTC notified the Company of their desire to arbitrate two IPD grievances. One concerns the practice of contacting people at home or at the bus lot to inform them of a change in area assignment for their next shift. The Council takes the position that any contact with an employee off the job constitutes work time for which he should be paid. The Company's position is that, while off the job contacts should be kept to a minimum, there are occasions when it is necessary to contact employees to inform them of changes in work location, and such contacts are not considered work time. The second case concerns the use of a qualified Utility Operator to replace an absent Pile Operator. While the Chemical Workers have objected to the practice of using Utility Operators for this purpose, the Company has consistently taken the position that such assignments are provided for under the flexibility clause in the Chemical Worker's Ratio Agreement.

The Labor-Management Relations Program was presented to 12 supervisors on July 15.

IPD GRIEVANCE STATISTICS 6-25-57 THROUGH 7-22-57

A total of 12 grievances was received and two Step II grievance meetings were held. Following is a breakdown of the status of these grievances:

	<u>Unit</u>	<u>Non-Unit</u>
Received this month	12	0
Received this year	125	1
<u>Step I</u>		
Answer satisfactory	1	0
Answer unsatisfactory	11	0
Pending time limit	13	0
Settled this month	8	0
<u>Step II</u>		
Discussed this month	7	0
Pending time limit	3	0
Settled this month	7	0
<u>*Arbitration Requested</u>	3	0
Total Settled This Month	15	0

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SUBJECT OF JULY GRIEVANCES

<u>Unit</u>	<u>B-C</u>	<u>KE-KW</u>	<u>D-DR</u>	<u>H</u>	<u>F</u>	<u>Fin.</u>	<u>Emp. Rel.</u>	<u>Fac. Eng.</u>	<u>Prod.</u>	<u>Res.& Eng.</u>
Overtime	1			1						
Jurisdiction	1	1	1							
Ratio Agreement			2							
Safety	2									
Personnel Development Program	1									
Transfer	1									
Work Assigned to Minor Construction	—	—	—	—	1	—	—	—	—	—
TOTAL	6	1	3	1	1	0	0	0	0	0
<u>Non-Unit</u>	0	0	0	0	0	0	0	0	0	0

Bargaining Unit Check-Off Statistics

	<u>Last Month</u>	<u>This Month</u>
Cancellations	12	7
Additions	34	19
Total Participating	985	997
Total in Unit	1471	1472
% Participating	66.9	67.7

*Step II grievances which the Council has formally indicated their intention to arbitrate are shown settled at Step II after three months, if no further action is taken.

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EMPLOYEE COMPENSATION OPERATION

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Salary Administration

July activities were highlighted by two meetings with the reactor plant managers to accomplish a limited reorganization of the maintenance functions within the Department. Paper work during July showed a marked increase primarily due to a reduction in staffing of Project Engineering.

The Specialist, Salary Administration conducted one regularly scheduled salary talk on July 17, 1957 on "General Electric Salary Plan for Summer Placement Program Employees" in 100-D Area, and one informal talk on July 23, 1957 on "General Electric Salary Plan and its Administration in IPD" in 100-F Area. Three maintenance positions were re-written in the H Reactor Operation and the approval of the Department Manager obtained. This cleans up several positions which were not properly described under the old guides.

CHANGES OF STATUS OF PERSONNEL

Transfers into Dept.	4
Transfers out	<u>4</u>
Location Changes	<u>0</u>
Suffix Changes	<u>6</u>
FISA Changes	<u>5</u>
Reassignments	<u>22</u>
Total	<u>41</u>

CHANGES IN SALARY OF PERSONNEL

Promotional Increases	3
Salary Review Increases	<u>42</u>
Interim Merit Increases	<u>11</u>
Salary Adjustments	<u>1</u>
Total	<u>57</u>

Wage Administration

A request for non-exempt job data in support of the annual Northwest Area Wage Survey has been received. The compilation of these data, although largely clerical in nature, will require the diversion of the Wage Specialist from planned program work.

Background work for the preparation of a new evaluation system have been accomplished, but the system will not be complete until late in September or early October.

CHANGES OF STATUS OF PERSONNEL

Retitles	1
Transfers between Depts.	<u>24</u>
Transfers within Dept.	<u>29</u>
Location changes	<u>0</u>
Reclassifications	<u>14</u>
Total	<u>68</u>

CHANGES IN SALARY OF PERSONNEL

Automatic Increases	<u>101</u>
Reclassifications	<u>61</u>
Merit Increases	<u>0</u>
Total	<u>162</u>

DECLASSIFIEDEmployee Benefits

The Employee Benefits program has been continued on the broad basis existing when the function was transferred from Employee Practices in June. While results have been generally satisfactory, progress in this area has been retarded due to the inclusion of functions and assignments which are not properly a part of the Compensation function. Unrelated functions and services such as Good Neighbor Fund, assistance with safety prize distribution, etc., are being studied for elimination, transfer or coverage by additional personnel so they will receive appropriate attention without watering down the Employee Compensation program.

	<u>Current Month</u>	<u>9-1-56 to Date</u>
<u>Military Service</u>		
Interviews:		
Preparation of Requests for Deferments or Reclassifications	5	34
Returned from Military Service	0	5
Entering Military Service	<u>0</u>	<u>3</u>
Total	<u>5</u>	<u>42</u>
Letters Requesting Deferment or Reclassification:		
Deferment in S.S.S. Draft	5	26
Reclassification of Stand-by Reserve Availability Status	<u>1</u>	<u>11</u>
Total	<u>6</u>	<u>37</u>
Deferments allowed for one year	2	19
Deferments denied for one year	1	4
Deferments appealed (State-Board)	1	3
<u>Employee Purchases</u>		
Special purchases handled by this office	1	17
Complaints by employees investigated and resolved	2	7
Letters written to obtain special G.E. goods	0	20
<u>Retirement Program</u>		
Retired	3	17
Pre-Retirement Contacts	12	12

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Fire Protection

Organization and Personnel

	Exempt	Non-Exempt
Employees - Beginning of the Month	11	41
Employees - End of the Month	11	41

Fire Responses

I.P.D. -----	3	Loss-----	\$15.00
R & U -----	3	Loss-----	Nil
Hanford Laboratories Operation-----	1	Loss-----	Nil
Outer Area-----	1	Loss-----	Nil

Description of Fires

R & U - Power line south of 181-B Bldg. - 7:08 AM July 3, 1957 - Arcing connection made pole appear to be on fire, No damage.

I.P.D. - NE end of building 181-D - 10:04 AM July 6, 1957 - Grass fire apparently caused by discarded smoking material, damage was nil.

I.P.D. - 100-H Burning Pit - 1:43 PM July 5, 1957 - Wind picked up burning material and carried it across the road to some salvaged lumber, damage was nil.

Outer Area - South of Old Hanford - 2:31 PM July 7, 1957 - Spontaneous Ignition of old cinder pile ignited grass, damage was nil.

I.P.D. - 184-F - 4:37 PM July 12, 1957 - Spontaneous ignition of coal in bunker #3 at 184-F, damage estimated at \$15.00.

R & U - Hanford Sub-station - 9:24 PM July 24, 1957 - High voltage arc to ground from 115 KV line ignited grass, damage was nil.

Outer Area - Near Pos. 03 U.S. Army - 8:47 AM July 31, 1957 - Grass fire apparently caused by discarded smoking material, damage was nil.

Hanford Lab. Opns. - 11:48 AM July 31, 1957 - building 1709-D - 3 masonite strips being tested in an electric oven caused considerable smoke, damage was nil.

Drills Held During July

Outside Drills	53
Inside Drills	40
Feet of ladders used on Drills.. ..	505
Feet of hose used on Drills	10,520

Meetings

Type of Meeting	Number of Meetings	Number Attending
Round Table	5	51
Informative	1	10
Safety	4	38
Security	4	37

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General

Seven employees of 100-D were given a demonstration in artificial Respiration.

G.A. Hirst attended two meetings with Civil Defense Authorities in regards to planning the alert on 7/12/57. One Fire Apparatus attended the evacuation for the protection of the Caravan.

G.A. Hirst made a preliminary inspection of a Tank Truck under construction in Portland and attended the Annual Conference of the Pacific Coast Inter-Mountain Association of Fire Chief's July 16th thru 19th.

Fire Extinguisher Activities

Inspected		785	Handlines Inspected		25
Installed		12	Handlines Serviced		16
Seals Broken		37	Hose Boxes Inspected		16
Serviced		183	Gas Masks Serviced		0
Weighed		116	Gas Masks Inspected		13

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HEALTH & SAFETY

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Personnel

Employees: Exempt - 4. Non-exempt - 1.

ACCIDENT STATISTICS

	<u>July 1957</u>	<u>Year to Date</u>
Disabling Injuries	0	0
Frequency	0	0
Severity	0	0
Medical Treatment Injuries	94	681
Frequency	2.11	2.33
Accumulated hours of exposure since last Disabling Injury (10-17-56)	3,913,493	

Fire Statistics

Fires	2	3
Losses	\$25.00	\$25.00

Security Violations

	<u>July</u>	<u>June</u>	<u>Year to Date</u>
Research & Engineering	0	1	9
Facilities Engineering	1	1	6
Finance	0	2	3
B Area	0	0	1
D Area	0	1	1
F Area	0	0	1
H Area	0	0	1
K Area	0	0	1
Total	1	5	23

There were no serious accidents during the month and the medical treatment injury performance was below estimate, indicating that another successful accident prevention month has been recorded.

At this time it appears likely that the President's Award will be attained on August 13, 1957. We are prepared to expedite the selection and distribution of gifts.

E. J. Fitzmaurice
 MANAGER
 EMPLOYEE RELATIONS OPERATION

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FINANCIAL OPERATION
MONTHLY RECORD REPORT
JULY, 1957

Administrative Planning

One new Organization and Policy Guide was approved and issued during the month with subject of "Issuance of Official Correspondence and Documents," and the guide "Collective Bargaining Agreements and Working Agreements," was revised. In addition eight Advices, two new and six revised, were released. The titles of the new Advices were "Technical Graduate Program" and "Selecting Personnel for Exempt Positions." Three Organization Announcements were processed for Level #5 changes. Revisions in the Advice on this subject will provide for official announcements at Level #4 and above, in line with uniform HAPO Department practices.

At month end the system was estimated to be 85 percent complete, including 117 of a scheduled 135 Advices, and 37 of a total of 47 scheduled Organization and Policy Guides. The balance of 15 percent is under active development, and consists mainly of policies and procedures for the implementation of Work Authorization, the primary responsibility for this series having been assigned to Facilities Engineering Operation.

The various sub-pools of the 100-H Area Motor Pool were combined on July 1, into a general pool at the Building 1716-H Garage under the supervision of Transportation and Maintenance Operation employees. This arrangement is proving to be quite satisfactory to all concerned.

The regular monthly issue of the Department Record Report was released on July 24, 1957.

General Accounting

A comparison was made of March 13 and May 31 financial plans for the Plant Acquisition and Construction Budget. Significant changes were the reduction of \$2,000,000 in Budget Item 2-23X-2061, Two "X" Reactors - Expansion, and the reduction of \$4,600,000 in Budget Item 223-57-A-2, Improvements to Reactor Instrumentation.

Pending passage of the FY 1958 Appropriation Act, a preliminary financial plan has been issued by the Commission. It includes \$5,106,000 for HAPO 2000 Program equipment expenditures. We are presently in the process of establishing priorities for FY 1958 equipment items.

The FY 1958 budget for FEO is being revised in order to reflect responsibility accounting and a reduction of funds.

A weekly FEO cost distribution report is now being issued and appears to satisfy the needs of FEO personnel. No additional cost personnel were required to provide this improved service.

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Project Unitizations completed, but not transmitted in July included:

CG-583	Moisture Monitoring System for Detection of Leaking Process Tubes - 100-B, D, DR, F & H	\$ 291 868
CG-558	Reactor Plant Modification - 100-F	6 737 600

The budget for fiscal year 1958 Attendance at Meetings of Professional and Trade Societies and Attendance at Off-Site Training Courses and Seminars has been established. The amounts are:

Attendance at Meetings of Professional and Trade Societies	\$ 13 500
Attendance at Off-Site Training Courses and Seminars	4 500

Product Cost and Budgets

The IPD fiscal year 1957 Savings and Improvement Report was completed and issued.

A new monthly Power Cost Report was devised. The report, in flow chart form, will summarize by building the flow of water, steam, total cost and unit cost from the River Pump House to the Reactor.

An overtime hours report by customer operation was issued for April, May and June. Since Procedures and Computing is economically unable at this time to furnish the desired information, field and financial people are collaborating in coding and manually transcribing the information from time cards.

A method of reporting Maintenance cost by craft and responsible foreman has been finalized and reports will be issued for Central Shops and 100-H Area Maintenance in August. It is felt that this report will furnish useful cost information at the first-line supervisor level and will pinpoint areas where cost improvement is most necessary. We plan to introduce this report in other maintenance operations after a trial period at 100-H.

A detailed analysis of IPD Maintenance overhead expenses was prepared for use as a basis for establishing revised standard DME rates. Revised rates were placed into effect July 29, 1957 for each of the six Reactor Maintenance Operations.

Personnel Accounting

Non-exempt employees received an additional 1.77% cost-of-living increase effective July 29, 1957. The increase applies to base pay and isolation rates and was reflected in pay checks delivered to employees August 9.

The adjustment in area allowance for exempt employees will be reflected in pay checks delivered to them on August 30, 1957.

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Auditing

Compilation of information for Davis-Bacon report was completed during the month by the special task force to which an IPD auditor was appointed.

A report for the results of the quarterly inventory of precious metals and special materials taken as of June 30, 1957 was issued.

A report covering the review of the FY-1957 year-end balances and closing entries was issued.

A letter was prepared to report the action taken on the recommendations made by the traveling auditors in the formal report of their 1957 audit work.

Cash funds located in 1760-H and 1704-K were counted.

Procedures

The first of three paperwork improvement clinics was held under the direction of Professor William Engesser. All exempt personnel of the Financial Operation were invited to attend, together with certain other personnel who were asked to attend for information purposes, by Managers-Finance of other departments and operations. Two more clinics will be held in August, to be followed by a continuing follow-up paperwork simplification program.

Two meetings of the task force on Office Automation were held in July. Several form flow charts were discussed in detail and possible improvements explored.

Manager-Finance
IRRADIATION PROCESSING DEPARTMENT

PD Lee:kd

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END

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9 / 8 / 92