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of
DE92 040140

MONTHLY RECORD REPORT

IRRADIATION PROCESSING DEPARTMENT

67204

SEPTEMBER, 1957

Compiled by

IPD PERSONNEL

October 21, 1957

RICHLAND, WASHINGTON

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J. N. Walker 7-27-92
D. G. Kish 7-21-92

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DECLASSIFIEDTABLE OF CONTENTS

General Summary	A-1 through A-6
<u>Research and Engineering Operation</u>	B-1 through B-37
Process and Reactor Development Operation	B-2 through B-13
Process Technology Operation	B-14 through B-19
Operational Physics Operation	B-20 through B-28
Irradiation Testing Operation	B-29 through B-33
Coolant Testing Operation	B-34 through B-35
Component Testing Operation	B-36 through B-37
<u>Production and Reactor Operations</u>	Ca-1 through Ch-6
Summary	Ca-1
B-C Reactor Operation	Cb-1 through Cb-11
D-DR Reactor Operation	Cc-1 through Cc-12
F Reactor Operation	Cd-1 through Cd-10
H Reactor Operation	Ce-1 through Ce-9
KE-KW Reactor Operation	Cf-1 through Cf-11
Production Operation	Cg-1 through Cg-6
Reactor Operations Statistics	Ch-1 through Ch-6
<u>Facilities Engineering Operation</u>	D-1 through D-15
<u>Employee Relations Operation</u>	E-1 through E-13
<u>Financial Operation</u>	F-1 through F-3

IRRADIATION PROCESSING DEPARTMENT
SUMMARY
MONTHLY RECORD REPORT
SEPTEMBER, 1957

RESEARCH AND ENGINEERING OPERATION

The only I & E slug failure to date occurred in the high specific power test at C Reactor this month. The charges were enriched to 1.44 wt.% of U-235 and had attained an exposure level of approximately 2000 MWD/T at a maximum specific power of approximately 90 KW/ft. The accelerated loading program at C-Pile and all other I & E slug test programs continued satisfactorily.

In other reactor fuel tests a possible preferential "grooving" attack on M-388 aluminum alloy at elevated coolant temperatures was observed; results from tests of the ball-socket Tru-line slug have led to the conclusion there is little benefit to this feature and the program has been terminated.

An extensive experimental and theoretical program studying the power excursion problem associated with the loss of water from a Hanford reactor has been summarized in HW-52341 and submitted to the AEC for review by nuclear safety groups.

The effect of thermal deterioration on the masonite section of the DR and H Reactors biological shields was analyzed. It was concluded that no safety problem exists with respect to extensive safety rod interference. The evaluation of the long range operational problem is continuing.

Analysis of recent outbreaks of ruptures resulted in instituting new fuel element failure control restrictions at the K Reactors.

An initial small scale test of poison splines at D Reactor was successful with the exception of mechanical difficulties.

A Panellit Gauge Manual (HW-51442) was issued to provide a listing of standard parts for all Panellit gauges for assistance in maintenance and procurement work.

PRODUCTION AND REACTOR OPERATIONS

Input production (Pu) for September was 97.8 percent of forecast. Production was slightly below forecast due to low time operated efficiency resulting largely from slug ruptures. Output production was 80.9 percent of forecast due largely to poor operating continuity and the discharge of some rupture-prone material at below goal concentration.

The maximum established power levels were increased 45 megawatts at F, 30 at B, and 25 at H. The increase at H was due to improved flattening. The B and F increases were due to operating at higher tube powers.

Forty-five reactor outages, of which 19 were scrams, resulted in an overall time operated efficiency of 77.9 percent. Forecast was 82 percent.

Twenty ruptures, 19 regular metal and one production test I & E slug (PT-IP-1A "Evaluation of I & E Slugs Operating at High Specific Powers") were removed from

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HW-52809

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the reactors during September. Five of the regular metal ruptures were at H, four at C, three at B, two each at B, DR and F, and one at KW. The production test I & E rupture was at C Reactor. Four of the ruptures at H Reactor were attributable to a 24 percent over-powering of near-center tubes during a cold startup. To avoid further ruptures from these tubes, 30 tons of metal were scheduled for discharge on October 1 at approximately 50 percent goal concentration. Six ruptures of metal canned in Hunter-Douglas cans led to the discharge of 111 tons of this material (largely at D, DR, KE and KW reactors) at approximately 60 percent of goal concentration.

Significant items of equipment experience were: (1) Seventy-seven process tubes were installed on the tube replacement program; 31 at B, 20 at H, 16 at D and ten at F. (2) Two process tube leaks, one at D and one at H, and one Van Stone leak at B were corrected. (3) New impellers and new type modified wearing rings were installed in two process pumps at 190-DR Building. (4) Additional leak tests of the DR far downcomer system failed to reveal leaks which were thought to be causing settlement of the far side of 105-DR Building. (5) A new, molded Hypalon seal was installed on the F Reactor downcomer. (6) Six rear face bellows gas leaks were corrected at F Reactor, which reduces gas loss approximately 1500 cubic feet per day. (7) Divers from McCray Marine Company completed an underwater inspection of the 181-H Building pump well and forebay. No removal of sand is planned at present since adequate channels are available at each end of the sand bar. (8) Gas consumption at KW Reactor continues to rise due to leaking rear face bellows.

IPD Disabling Injury No. 2 occurred September 3 at 105-D when a Processing Operation operator lost the tips of three fingers in a charging machine accident. There were no security violations or radiation over-exposures during September. Significant contamination to the discharge area and exhaust air for cells occurred at C Reactor when a ruptured production test I & E slug ignited during discharge. No significant deposition of radioactive particles was found in the area or surrounding vicinity.

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

Work was initiated on a study of the economic and engineering feasibility of converting a K Reactor to production of electric power.

A report was transmitted to the Commission of a new production reactor design concept which is believed to combine low capital cost per unit of production capability, low unit cost of plutonium produced, and flexibility in regard to possible future economic and technological changes.

Equipment Development

During a recent startup at D Reactor, increased production valued at an estimated \$6,000 resulted from the use of eleven poison splines. Plans are being made to conduct a startup employing all of the potentially usable loading of thirty splines.

At 105-C Reactor, the CG-651 vertical gamma monitor system has detected all four ruptures which have occurred in the ball valve pattern.

A first prototype of an improved process tube-wall integrity checker has been procured, and a test of this probe on installed process tubes has been scheduled.

Plant and Industrial Engineering

The extension of HAPO's 15,000 kilowatt interruptible power contract was assured by Bonneville Power Administration through September and a cut off date remains to be arranged.

An inspection of the outside block walls of 185-B and 190-B Buildings discloses that approximately 100 blocks are loose in all four walls. A layout showing location of the loose blocks is being prepared.

The topographic surveys of 181-B-C and 181-D-DR forebays have been completed. A program to clean the forebays in 100-B, D, and H Areas is being planned.

Project Engineering

The number 2 pump in 190-B was examined for cavitation damage. This pump has the original impeller without wear ring inserts and has operated for approximately nine months. Cavitation holes were present in all vanes on the inboard side, and three vanes had holes on the outboard side. Recently the pump characteristics have begun to change more rapidly.

The flush discharges during shutdown made from the CG-651 pattern of tubes this month (26 in all) included two incidents in which the ball valves failed to open. No reason was found to explain one failure. A faulty hydraulic line connection caused the other failure. The faulty connection was found and corrected.

Principal Engineers

Failure of K Area resistance temperature detectors is being caused by water entering the barrel through pinpoint openings and micro-cracks, and shorting the circuit. The seriousness and prevalence of this condition is under investigation.

Engineering Auxiliaries

The HOO-AEC Labor Standards Board approved nine jobs for plant forces. One job was turned down in the field and not submitted to the Board. Nine more assignments are being reviewed.

Special Maintenance

The name of the Project Maintenance Operation was changed to "Special Maintenance", effective September 1, 1957.

EMPLOYEE RELATIONS OPERATION

In Personnel Development, principal attention was devoted to construction of a form and plan to supplant the relevant portion of the performance appraisal undergoing revision. The four leaders of Professional Business Management I were scheduled to attend a one-week refresher course. The forecast for permanent placement in the Department of Technical Graduates from the rotational program was revised downward to a total of nine. This compares to a total of 23 forecast one year ago for the same period--the last three quarters of FY 1958. Thirty additions to the Department Payroll were made and 36 employees were removed from the roll.

On August 21, 1957 the National Labor Relations Board rendered a decision dismissing

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HW-52809

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the Hanford Atomic Metal Trades Council's claim that the 13 Engineering Assistants in 1706-KE-KER should be part of the bargaining unit. On August 22, the Company received notice that a Charge Against Employer had been filed by an IPD employee, alleging that his supervisor had given him a "bad rating" primarily because of his use of the grievance procedure; the Company's answer to the charge was forwarded to the NLRB on September 12. Approximately 90 days ago, the Chemical Workers and Operating Engineers served notice on the HAMTC to the effect that they were refusing to pay per capita dues to the Council. International Representatives of the two locals will be in Richland during the week of September 26 in an attempt to resolve this situation.

Forty-two individual cases of salary action were analyzed and processed as a package during the month. These interim salary increases were approved by the General Manager and are expected to complete essentially all interim increases for the remainder of the calendar year. An audit of existing Chief Operator positions has been completed in an effort to decide whether to make the positions exempt; final decision should be forthcoming by month-end. Effort has been directed to Engineering Assistant classifications and drafts prepared of data to be submitted to the Commission requesting concurrence in the establishment of Engineering Technician classifications at Grade 24.

The one alarm response during the month was for a fire in weeds and trash at the northeast end of the 181-D Building; damage was nil. Practice assemblies were held for the Emergency Rescue Crews, one each on September 24, 25, 26 and 27.

Mass communication activities included the publication of four Management NEWS Bulletins, four "Memos from the General Manager" and eight "Union Relations Information" bulletins; five issues of "Management Information for Foremen and Supervisors" were distributed during September as was one health bulletin and the MONOGRAM. Two priority messages were initiated. Oral communication activities included two Report to Employees meetings, one Management Information Meeting, and the presentation by the Communication Specialist of three 2-hour Communication Workshops in F Area.

The first disabling injury in 1957, occurring September 3, was a traumatic amputation of distal Phalanx of the first and second fingers of left hand; recommendations were made to prevent recurrence. The IPD Safety Philosophy for 1958 was released to all supervision.

FINANCIAL OPERATION

A Subject Index for both OPGs and Advices was released September 16.

The Financial Plan for FY 1958 has not yet been received from the Commission.

It has been estimated by HAPO that IPD's share of equipment funds for FY 1958 is \$1,418,000. The amount is not a firm allocation of funds to IPD, but it provides a basis for immediate use of equipment funds and for future planning. A firm allocation cannot be made until the Financial Plan is received.

Maintenance Management has expressed interest in a cost breakdown by Foreman and Craft which is now being prepared for H Area. It has been determined that the information cannot be supplied for all areas until IBM changes are made.

The State of Washington unemployment record was such that a refund of unemployment taxes paid for 1956 has been made to employers. The State of Washington operates on a reserve fund basis, with unemployment payments and employer contributions being charged and credited, to the fund. The reserve fund is maintained at or below a maximum balance, so that when the unemployment record is good, employer contributions need not be as high to maintain the fund. IPD's portion of the credit is \$56,483, which will be applied to FY 1958 employer contributions until the credit is exhausted. This credit represents approximately 25% of the total I.D tax obligation for Washington unemployment insurance.

Assembly and editing of transcripts of the three paperwork improvement clinics conducted by Professor William Engesser has been done preparatory to their reproduction for distribution to those who participated in the clinics.

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IRRADIATION PROCESSING DEPARTMENT
MONTHLY REPORT OF INVENTIONS OR DISCOVERIES

SEPTEMBER, 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

none

TITLE

none

General Manager
IRRADIATION PROCESSING DEPARTMENT

AB GRENINGER:mfa

RESEARCH & ENGINEERING OPERATION

SEPTEMBER 1957

VISITORS AND BUSINESS TRIPS

R. D. Abbott and J. W. Freshour, American Standard, Redwood City, California, visited HAPO September 16, 1957, to obtain information on reactor technology for dual purpose reactors in connection with AEC Directive I.

R. L. Dickeman visited USAEC, Washington, DC, September 16-18, 1957, to discuss reactor plans for Hanford.

E. C. Wood visited Nuclear Metals, Cambridge, Mass., Mallinckrodt Chemical, St. Louis, Mo., and National Lead, Cincinnati, Ohio, September 14-19, 1957, to discuss fuel element fabrication and cost information.

D. E. Sturge visited Shell Development Co., Emeryville, Calif., September 3-6, 1957, to expedite the procurement of probolog instruments.

ORGANIZATION AND PERSONNEL

	<u>Permanent</u>		<u>*Rotational</u>	
	<u>August</u>	<u>Sept.</u>	<u>August</u>	<u>Sept.</u>
Management and Administration	4	4	-	-
Process and Reactor Development Operation	33	30	5	4
Process Technology Operation	37	38	7	8
Operational Physics Operation	20	20	6	6
Irradiation Testing Operation	22	20	2	2
Coolant Testing Operation	25	25	2	2
Component Testing Operation	23	23	3	1
	<u>164</u>	<u>160</u>	<u>25</u>	<u>23</u>

* Includes summer program personnel

PROCESS & REACTOR DEVELOPMENT: J. A. Roberson, Senior Engineer, terminated 9/6/57. D. C. Pound, Senior Engineer, terminated 9/13/57. M. D. Hannon, Engrg. Asst., terminated 9/19/57.

PROCESS TECHNOLOGY: R. D. Benson, Utility Operator, IPD, F Reactor Operation, transferred in as an Engineering Assistant, 9/2/57.

IRRADIATION TESTING: W. J. VanDenberg, Engineer I, transferred to Cincinnati, Ohio, 9/6/57. J. C. Johannesen, Engineer II, terminated 9/13/57.

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PROCESS AND REACTOR DEVELOPMENT

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Reactor FuelsI & E Slugs - C-Pile Pilot Test

An additional 294 tubes of I & E fuel elements were charged in C-Pile this month as the loading program is taken from the nominal 50 tube per month schedule to a full C-Pile load targeted to be complete January 1, 1958. A total of 915 I & E slug loaded tubes have now been charged in C-Pile and 605 remain under irradiation at the month's end. Eighty-three tubes were discharged this month at an average exposure level of 790 MWD/T. The maximum specific power for the elements under irradiation remains at about 60 KW/ft. No ruptures have been experienced in any natural uranium I & E fuel element irradiated at Hanford to date.

The first I & E slug failure of any type occurred in the high specific power test at C-Pile (Production Test IP-1-A). A failure occurred in one of three I & E slug charges, enriched to 1.44 weight percent U-235, which had successfully attained an exposure level approximating 2000 MWD/T at an approximate maximum specific power of 90 KW/ft. The rupture mechanism has not been established. The solid enriched control columns failed earlier at exposures approximating 1000 MWD/T and a substantial degree of performance improvement for the I & E slug over solid slugs is derived from a statistical analysis of these results, e.g., a fifty-fifty chance that a 30-fold improvement has been demonstrated has been derived.

I & E Slugs - K Piles

Both of the preliminary I & E charges loaded at K-Pile - PT IP-70-A - were discharged at 500 MWD/T without incident. The K I & E slug was found to be oversized from a hydraulic and heat transfer point of view but the C-size I & E slug performed well from this point of view; the C-size I & E slug does have a reduced hydraulic resistance at the pile and the ability to use it will depend upon engineering studies in the hydraulic systems which are currently underway. For small-scale test loadings, however, the C-size I & E slug will be adopted and the 50 tube/month charge rate will begin next month. We still plan to initiate the approach to a full pile load by January, 1958.

I & E Slugs - Old Piles

Four charges of BDF size I & E slugs and four charges of regular solid uranium control slugs are now operating in D-Reactor as the initial phase of the effort to develop the in-pile technology to permit the full-scale use of I & E slugs in the five older piles. The thermal and hydraulic characteristics of this load are not well described by the current data because erratic thermocouple probe data and plans to replace the instrumentation as well as independently repeat the four tube test are completed.

I & E Slug Rupture Suspect - C-Pile

The I & E slug charge in tube 2470 C was discharged when weak rupture indications were noted on the rupture detection equipment. A very thorough examination of all pieces in the suspect column, including immersion in boiling water, failed to reveal any instance of jacket penetration and it is thus concluded that no fuel elements in this charge were ruptured.

M-388 Alloy Aluminum Jacketing Material

A production test authorizing the full-scale use of M-388 aluminum alloy components, i.e., aluminum with 0.5 percent iron and nominally one percent nickel, has been authorized for the central zones of DR and KE Reactors for large-scale in-reactor experience. Loading of the initial 70 tubes at KE Pile was accomplished late last month and KE Pile utilization will continue on a similar monthly schedule; the 70 tubes per month program begins in DR Pile this month. The program at KE Pile authorizes the use of 0.5 inch cored slugs canned in M-388 jackets with the blunt-nosed Tru-line feature.

Fuel charges loaded alternately with slugs canned in 1245 (2S) and M-388 aluminum alloys and irradiated at elevated coolant temperatures (up to 130°C tube outlet) were discharged at B Pile. Incomplete examination data show a generalized pitting attack that is not preferential to either alloy but also a suggestion of a preferential "grooving" attack on the M-388 alloy. This latter effect, which has not been observed at the lower process temperatures is under intensive study to isolate its cause and possible significance.

Tru-line Slugs

Thirteen failures have occurred to date in the ball-socket Tru-line slug; five of these have been definitely classified as "hot-spot" failures. These data suggest that there is little benefit to the ball-socket Tru-line feature and, except for working off current inventory, this program is terminated.

The production test for the evaluation of the improved blunt-nose design has begun with the initial pilot loading at D Pile this month.

High Temperature Coolant Fuel Element Irradiations

Large diameter massive I & E fuel elements continue under irradiation at outlet temperatures of 180° and 200°C in KER loops 2 and 4 without incident. The charging of the four-rod stainless steel jacketed cluster elements in KER loop 3 has been delayed by pump failure but is scheduled to be accomplished during the next KE outage.

A group of large diameter wafered I & E fuel elements have been fabricated by Hanford Laboratories personnel and will be included in the KER testing schedule at an early date if favorable destructive and non-destructive test data are obtained.

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

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HW-52809

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TABLE I

ACTIVE PRODUCTION TESTS - FUEL DEVELOPMENT

Test Number	Type Metal	No. of Tubes	Reactor	Goal Exposure	Current Exposure	Remarks
105-586-A	U-S1 Ingots	1	B	900		Discharged at 1007 MWD/T
	U-S1 Ingots	4		2 ruptures		Not yet charged.
	U-S1 Cored	3		900		Not yet charged.
	Control	4		2 ruptures		Not yet charged.
105-620-A-65MT Supplement B	Tru-line	803	C	Normal goal		Provides for quantity charging of Tru-line slugs.
DT-105-623-A Regular			DR	Normal goal		Provides for hand seating of charges loaded on alternate outages. Investigates effect upon failure rate.
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."
IP-1-A	1.44% U-235 I & E Lead Dip	4	C	2 ruptures		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. Rupture occurred in an I & E charge at about 2000 MWD/T. Remaining tubes were discharged. Irradiation complete.
	1.44% U-235 Solid, Lead Dip Canned	4	C	2 ruptures		

TABLE I (Continued)

Test Number	Type Metal	No. of Tubes	Reactor Goal	Exposure Current	Exposure	Remarks
IP-4-A	Cored	389	KE			Authorizes irradiation of production quantities of cored slugs.
		75	H			
IP-19-A	Lead Dip Canned I & E	605	C	800 variable	50-750	Provides for the pilot charging of I & E slugs at C-Reactor.
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 °F in D Reactor. Rupture occurred in regular control piece at 607 MWD/T in KE-Reactor. Irradiation complete.
		22	KE	Normal		
		12	C	400,500,600	All tubes dis- charged at goal	
		20	C	Normal		
		17	C	Normal (cored)		
		8	D	400,500,600	All tubes dis- charged at goal	
		19	D	Normal		
		10	B	300,400,500	All tubes dis- charged at goal	
		22	B	Normal		
		2	B	Normal (cored)		
		20	B	Normal (cored)		
IP-44-A	Vacuum Canned I & E Slugs	4	C	400,600,800	About 410	
IP-45-A	Hot Press Canned I & E Slugs	4	C	400,600,800	About 410	

TABLE I (Continued)

Test Number	Type Metal	No. of Tubes	Reactor	Goal	Exposure	Current Exposure	Remarks
IP-56-A	Dingot U	7	DR	500		150-450	Uranium cores are low hydrogen content dingot U. Eight exposure charges discharged for special pick-up.
IP-58-A	Alpha Extruded 16 Uranium	260	DR	Normal			Five tubes discharged at about 270 MWD/F.
IP-75-A	1.8 Inch Massive I & E	1	KE	105 Operating Days	About 320		
IP-80-A	M-388 Alloy Jackets	About 70 (cored)	KE	Normal			Provides for quantity charging of M-388 alloy jacketed slugs.
IP-81-A	Blunt-nose Solid	10	D	300,500		About 130	
IP-90-A	1.8 Inch Massive I & E	1	KE	105 Operating Days	About 175		
IP-91-A	Reduced Auto-Clave Cycle	9	D	300,400,500		About 120	Regular solid uranium pieces which have been processed with a shortened (to 12 hours) auto-clave cycle.
IP-95-A	Lead Dip Canned I & E	4	D	400,600,800		About 310	
	Lead Dip Canned I & E	4	D	2 ruptures			Not yet charged.
	Regular Control Solid	4	D	400,600,800		About 310	
	Regular Control Solid	4	D	2 ruptures			Not yet charged.

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HW-52809

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Reactor Physics

Theoretical Analyses

Considerable effort has been expended in attempting to correlate measured values of P (resonance escape probability) with semi-empirical calculations without entirely consistent results. An effective resonance integral of the form

$$\int \frac{dE}{E} \Big|_{\text{eff}} = 9.74 \left(\frac{1}{F} + 2.66 \frac{S}{M} \right)$$

was derived from the data of many independent investigators; here F is the resonance disadvantage factor and the cross section for infinite dilution is taken to be 282 barns. The use of this effective integral in the standard exponential form for the resonance escape probability yields the following for dry lattice calculations:

<u>Slug Size</u>	<u>Lattice Spacing</u>	<u>P experimental</u>	<u>P calculated</u>	<u>Percent Difference</u>
1.679 inch OD	7.5	0.763	0.775	+1.6%
1.679 inch OD				
0.75 inch ID		0.786	0.797	+1.4%
1.923 inch OD	8.375	0.755	0.767	+1.6%

Unfortunately some measurements, such as the K Pile startup measurements in the K lattice do not show even this degree of agreement between experiment and calculation; differences as great as three percent exist. A definitive program, which includes both theoretical and experimental facets, to probe the reasons for these discrepancies further has been developed and is underway.

Experimental Lattice Physics

The program of lattice buckling measurements carried forward by Hanford Laboratories personnel has been largely completed from the 1.66 inch solid slug with some complementary work on cored and I & E geometries completed by Reactor Physics in the Physical Constants Test Reactor. Preparations are underway to initiate efforts in a program of buckling measurements for cluster fueled lattices; because of availability of materials the first assemblies will be 0.926 inch rods in nominal three inch ID process tubes.

Reactor Safety

An extensive experimental and theoretical program to study the power excursion problem associated with loss of water from a Hanford pile has been summarized in HW-52341, "The Need for Accelerated Safety Rods," by J. H. Brown. This study concludes that acceleration of the safety rod systems in all piles except the K piles will be required to ensure conformance with the current safety criterion

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HW-52809 DEL

that "gross melting of components should not occur in the critical reactor immediately following instantaneous loss of pressure;" the degree of acceleration required amounts to about fifteen accelerated rods per pile. It is further concluded, but not discussed in the above report, that no rod acceleration is required if 1) realistic rates of pressure decay are substituted for "instantaneous loss" and 2) aluminum melting but not uranium melting is permitted during the power excursion. These conclusions are being forwarded to the Commission for review by nuclear safety groups.

The details of the power excursion study are documented in HW-52340, "Process Tube Boilout Experiments," D. C. Pound and G. J. Busselman and HW-52339, "Speed of Control in Hanford Reactors," J. C. Peden and J. H. Brown.

Technical Criteria - Project CG-771

The technical criteria for the projected reactor to be scoped under Project CG-771 are largely complete in the physics area; major current exceptions are long term reactivity gains and temperature coefficients computational methods.

Reactor Engineering

Graphite Technology

Production Test IP-110-A authorizing a high temperature graphite burnout experiment at KW Pile has been approved; J slugs loaded in a localized pattern will provide the elevated graphite temperatures in a centrally located process channel used for sample irradiations. It is expected that oxidation data can be obtained at 650 - 700°C with 85 - 95 percent helium atmosphere.

Development Test IP-103-A authorizing in-pile testing of graphite thermocouple stringers has also been approved and is underway at D Pile. This test is part of a program to provide increased accuracy and longer service life under present operating conditions and improvements in graphite temperature instrumentation are much more urgent under the projected temperature and flux conditions.

Coolant Temperature Control - I & E Slugs

Although modified diameter I & E slugs are expected to substantially assist the high top-of-annulus coolant temperature problem efforts to alleviate the problem through mechanical means are continuing; as a minimum, relaxation of the need for redimensioning results in improved process economics. Efforts to provide a performance tested method of reducing rib height in process tubes is continuing in Facilities Engineering. Tests and modifications on the oblique cutter tool are continuing with largest problem now apparent that of handling chip removal. A revolving milling cutting tool is in the final phases of fabrication and is scheduled for testing next month.

A water mixing element which inter changes the hole and annulus coolant streams has been demonstrated as capable of eliminating high top-of-annulus temperatures although it has undesirable pressure drop and boiling protection monitoring qualities. An additional test of this device was charged in C-Pile this month and 250 mixing elements have been requisitioned for possible use in the full C-Pile I & E load.

Top Shield Integrity - DR and H Piles

The structure of the biological shields at DR and H piles has been analyzed to assess the probability of extensive safety rod binding as the masonite contracts as the result of thermal deterioration. Extensive safety rod interferences is assessed as unlikely and certainly the probability of any large fraction of the system being simultaneously bound is small. It is therefore concluded that no safety problem exists although the long-range operational problem is still under evaluation.

Tube Coolant Boiling Protection

Document HW-51659, "Specification A-020 - Process Tube Instability Limits," K. W. Hess, was issued stating the current philosophy of process tube boiling protection and presenting the limits in general terms. Additional documentation explaining the method of calculation is under preparation.

Document HW-52350, "Revised I & E Fuel Element Instability Limits," K. W. Hess, was issued discussing the use of standard solid slug instability limits for I & E fuel element charges.

Several Thermal Studies

The process piping system transient studies were continued from last month. The bulk outlet water pressurization effects were calculated for a steady state water flow of 74 percent after the rupture of one side of the reactor process piping system (i.e., no cross-tie manifolds open between the near and far side piping). This showed that no serious pressurization effects would occur in the reactor from the loss of one side of the flow system.

The data obtained from two trip-out tests at the KE Reactor performed on July 26, 1957, were analyzed and a report is in process. These tests showed that installing electric reactor trip signals upon the loss of one or more pumps would reduce the outlet temperature surge from 7 to 1°C. This corresponds to a bulk temperature limit increase of 1°C.

An analysis of K Reactor possible thermal rod warp during the period of zero to two hours after shutdown showed a possible 5 to 30°C temperature variation around the rod circumference. This variation, for rod contact with the graphite channel, corresponds to a rod warp of 0.5 inches/30 ft. This may explain all or part of the rod sticking problems associated with trying to withdraw these rods about 45 minutes after a reactor scram.

Reactor Planning

Combined Operations Study

An analysis of variable goal exposures for operation of a marginal cost goal is complete. Specific example calculations performed using the Commission's marginal cost value tend to confirm earlier opinions that no large changes in present reactor operations are required to conform with marginal cost goal method of operation. The detailed incremental cost relationships required to put this plan into effect are being developed.

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HW-52809

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Evaluations of the capability and economics of various alternate tritium production methods at Hanford are underway for consideration at the next Combined Operations Working Group meeting tentatively scheduled for December. Hanford studies are concentrating on methods using slightly enriched uranium rather than weapons grade U-235 as fuel.

Reactor Evaluations

The technology of producing tritium in target slugs at elevated temperatures has been reviewed in detail. The tentative conclusion is that a nominal development effort would demonstrate a target slug design that would produce tritium in a 300°C coolant environment. This development program is being formulated and will be carried out as part of the authorized Category II development effort.

Radiological Engineering

Radiation Control Experience

As the result of paired off-scale pencil readings recorded for a Pile Operator in the B Processing Operation on August 30, 1957, the badge was processed and indicated a dose of 9.2 rads (all beta). This was a one day exposure, the film in the badge having been changed on the day previous. The employee made only one entry to a radiation zone on that day. The nominal radiation level existing within the zone could not account for the high badge reading. Here again as in the case of four other high badges in the past three months, the only known way in which the badge could have been thus exposed is by deliberate exposure to a strontium⁹⁰ source used to check portable instruments. These cases continue under investigation.

Eighteen Reports of Lapse of Radiation Control were issued during the month. All of these were the responsibility of the Irradiation Processing Department.

There were nine cases of the spread of contamination to the skin and personal clothing of employees of such a magnitude as to be judged Lapses of Control. In three of these cases the individual received significant radiation exposure from the contamination. There were two Lapses of Control during the month which were caused by the spread of high level contamination to SWP clothing. In both cases the employees involved received uncontrolled exposure to radiation from the contamination. There were four cases of uncontrolled exposure to radiation from sources other than skin or SWP clothing contamination. One of these was due to inadequate timekeeping arrangements. One was due to improper procedures and inadequate monitoring during maintenance work in a 115 building. One occurred when a maintenance employee received an estimated exposure of greater than 300 exposure units in a seven-day period. The fourth case of this type is the high badge and pencil indications of the employee at 100-B Area which was discussed above. There was one case of employees being exposed to contaminated air without proper respiratory protection. In two instances the uncontrolled spread of high level contamination outside radiation zones occurred. One of these spreads occurred during the removal of an X-level facility from a reactor, and the other occurred when a ruptured slug ignited and burned for several minutes during rupture removal operations. Contamination was spread to the discharge area, the exhaust system, and to some extent to the outside ground areas.

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>	<u>IPD Totals</u>
Processing	1	1	1	1	0	0	0	0	
Maintenance	2	0	2	1	1	1	1	0	
Supplemental Crews	0	0	1	1	0	0	0	0	
Radiation Monitoring	0	0	2	0	0	0	1	0	
Research & Engineering	0	0	0	0	0	0	2	0	
Reactor Operation	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	
Assigned Totals	3	1	3	4	1	1	2	0	15
IPD Unassigned									3

Vertical columns do not necessarily add up to the indicated totals because in some cases Lapse of Control are chargeable to two or more components.

Effluent Water Statistics

These data are reported through the cooperation of the Radiation Protection Operation, Hanford Laboratories Operation.

Activity in the River Water at Pasco*

July	< 0.64% MPC _{GI} **	< 12.8% off plant limits
August***	< 0.73% MPC _{GI} **	< 14.6% off plant limits
September		

Activity in Raw Water at 100-F*

July	< 1.31% MPC _{GI} **	< 13.1% plant limits
August***	< 3.3% MPC _{GI} **	< 33% plant limits
September		

September values were not reported. Because of difficulties in completing radiochemical analyses, henceforth this data will be reported a month late, that is, September results will be reported in the October report.

* These data include some values that were below detection limits. The detection limits were substituted for real values which were unknown.

** 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.

*** August values for the activity in river water at 100-F Area and Pasco were changed by improved analytical results which were not known until after the August report was published.

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HW-52809

DEL

Reactor Effluent Activity Output			
September 1957		August 1957	September 1956
100-B	19 x 10 ³ mc/sec.	16 x 10 ³ mc/sec.	19 x 10 ³ mc/sec.
100-C	50	32	27
100-KW	33	35	22
100-KE	26	13	17
100-D	11	14	7
100-DR	18	11	28
100-H	22	17	12
100-F	47	16	7

Radiation Control Standards and Procedures

The following standards and procedures are in the rough draft stage of preparation:

- Standard 1.7 - Maximum Personnel Exposure Rates
 - 2.1 - The Bioassay Program
 - 2.4 - Rev. Respiratory Protection - Gas Activity
 - 4.6 - Change Stations
 - 8.2 - Liquid Radioactive Waste Disposal

- Procedure 1.5 - Radiological Protective Clothing
 - 4.2 - Determination of Personnel Dose from Skin or Clothing Contamination.

The following standards and procedures have been added to the manual:

- Standard 1.6 - Radiation Exposure Received at Off-site Locations
 - 2.2 - Radiation Zone Injuries
 - 9.1 - Design of New Facilities and Changes and Modifications to Existing Facilities
 - 10.3 - Standard Routine Survey Schedule

- Procedure 5.1 - Radiation Zone Injury Procedure
 - 7.1 - Disposal of Purge Effluent

The following standards are still circulating for acceptance signatures:

- Standard 1.1 - Rev. Personnel External Exposure Limits
 - 1.2 - Rev. Personnel External Exposures Under Emergency Conditions
 - 1.3 - Rev. Removal of Personnel from Radiation Zone Work and Return
 - 4.4 - Radiological Signs and Symbols

Reports issued during the month include the following:

- HW-52413 - "Monthly Status Report - I & E Slug Development, August, 1957," F. W. Van Wormer, September 9, 1957.
- HW-52410 - "Radioactivity in 100-H Water," R. B. Hall, September 13, 1957.
- HW-52350 - "Revised I & E Element Instability Limits," K. W. Hess and N. R. Miller, September 3, 1957.
- HW-52447 - "C-Reactor I & E Hydraulic Demand," K. W. Hess, September 12, 1957.
- HW-52339 - "Speed of Control in Hanford Reactors," J. C. Peden and J. H. Brown.
- HW-52340 - "Process Tube Boilout Experiments," D. C. Pound and G. J. Busselman.
- HW-52341 - "The Need for Accelerated Safety Rods," J. H. Brown, September 3, 1957.

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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	Bulk outlet coolant temperature (93 C)	Safety of outlet piping
C	950 kw maximum tube power	Fuel element failure control
D	950 kw maximum tube power	Fuel element failure control
DR	900 kw maximum tube power	Fuel element failure control
F	950 kw maximum tube power	Fuel element failure control
H	850 kw maximum tube power	Fuel element failure control
KE	1175 kw maximum tube power	Fuel element failure control
KW	1275 kw maximum tube power	Fuel element failure control

GENERAL PROCESS ENGINEERINGFuel Element Failure Control

Analysis of recent solid fuel element failure outbreaks indicates the possibility that failure rates may increase sharply when some specific power level is exceeded. If such a phenomenon does exist, it is probably associated in some manner with the transformation of uranium between the alpha and beta phases. Because of this possible fuel element performance characteristic, changes in the method of administering fuel element failure control restrictions have been instituted at the K Reactors. The tube power of the maximum power tube instead of the average of the highest power tubes will be controlling at tube power levels in excess of 1225 kw and immediate shutdown is required if the specified fuel element failure control point is exceeded by one per cent or more.

WATER TREATMENTExperimental Filter Studies

Operation of the model filter plant was continued. Additional data were obtained on the relationship between filter material particle size and filter efficiency.

Water Quality Studies

Plant and laboratory studies of optimum filtered water clarity requirements for reactor use were continued.

Aluminum Oxide-Sulfuric Acid Feeder

Fabrication of prototype equipment for testing the feasibility of substituting aluminum oxide and sulfuric acid for aluminum sulfate as a water plant coagulant is approximately 75% complete.

PROCESS STANDARDS

HW-46000 B - Process Standards - Reactor

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

Process Standard A-080 - "Emergency Water Supply"

The revision provides data on top of riser pressures corresponding to the specified emergency high tank flow rates. No other indication of high tank flow is available. Specifications were also included on mesh and wire size for high tank screens.

Process Standard D-020 - "Ruptured Slug Detection"

Because the Gamma Monitor has been found to be a reliable rupture-detection device, the Standard was revised to recommend that the reactor be shut down within 30 minutes after receiving a full-scale Gamma Monitor indication.

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

See explanation under H-020, below.

Process Standard H-020 - "Handling of Irradiated Enriched (U²³⁵) Slugs"

Prior to these revisions of Standards H-010 and H-020, E slug handling requirements were identical to those for C slugs. After the use of E slugs increased, these original requirements became unnecessarily restrictive. The Standards were revised to specify handling of E slugs consistent with their enrichment and reactivity.

HW-46000 D - Process Standards - Reactor

Five revised and one new Standard were issued during the month. These were:

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

Temperature maps are no longer required at intermediate power levels during secondary cold start-ups provided there have been no loading changes.

Process Standard D-020 - "Ruptured Slug Detection"

This revised Standard is identical to that issued for HW-46000 B, above.

Process Standard D-060 - "Emergency Evacuation of Personnel"

This new Standard lists precautions that are designed to minimize reactor damage if it should be necessary to evacuate personnel.

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Process Standard F-030 - "Charge-Discharge During Shutdown"

The Standard was revised to permit use of a new charge-discharge lubricating oil. The new oil, which is less expensive than similar oils currently in use, will not significantly reduce the transparency of slug-storage-basin water.

Process Standard H-010 - "Storage and Handling of Unirradiated Enriched Slugs"
Process Standard H-020 - "Handling of Irradiated Enriched (U²³⁵) Slugs"

These two revised Standards are identical to those reported for HW-46000 B above.

HW-46000 F - Process Standards - Reactor

Three revised and one new Standard were issued during the month. These were:

Process Standard C-040 - "Graphite Temperature Limits"

The revision clarified the definition of serviceable graphite thermocouple stringers and, in addition, specified that after January 1958, any stringers not meeting serviceability requirements shall be replaced within three months.

Process Standard C-070 - "Horizontal Rod Withdrawal - Power Increase"
Process Standard D-060 - "Emergency Evacuation of Personnel"
Process Standard F-030 - "Charge-Discharge During Shutdown"

These three Standards are identical to those issued for HW-46000 D, above.

HW-46000 H - Process Standards - Reactor

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

Process Standard C-070 - "Horizontal Rod Withdrawal - Power Increase"
Process Standard D-060 - "Emergency Evacuation of Personnel"
Process Standard F-030 - "Charge-Discharge During Shutdown"

These three Standards are identical to those issued for HW-46000 D, above.

Process Change Authorizations

Ten Process Change Authorizations were issued during the month to permit temporary relaxation of Process Standards HW-33000 and HW-46000, and one was issued to permit temporary relaxation of Process Standards - Water Plant, HW-27155 Rev1. These were:

PCA #230 - "KER Loop #2, KE Reactor"

The PCA allowed bypassing of the KER boiling suppression instrument on Loop #2 following an unexplained trip of the instrument. This was done to prevent unnecessary outages, and to permit observation of the instrument. While the instrument was bypassed, boiling suppression protection was provided by the exit-pressure low trip and the exit-temperature high trip.

PCA #231 - "Seismoscope - Ball 3X Trip - KE Reactor"

The PCA permitted placing the seismoscope in the #1 Safety Circuit until the next outage, instead of in the #3 safety circuit as required by Standards. This was to prevent unnecessary ball drops due to trouble in the seismoscope circuit, the source of which had not then been determined. Manual insertion of balls was required in case of loss of water or indication of an earthquake. The trouble was later traced to faulty relays, which have since been replaced.

PCA #232 - "Flow Balance Valve - B Water Plant"

During pump repair in the 190-B annex, it was necessary to operate with an unbalanced (2-4) pump configuration. Under this circumstance, if the flow balance valve remained closed as required by the Standards, a large riser pressure unbalance would exist. This would make many Panellit gauge range changes necessary. Because risk of line failure was small, the PCA permitted operation with the flow balance valve open for the short time it was necessary to use the 2-4 pump configuration. Pump repairs were completed within seven hours.

PCA #233 - "Ball 3X Pressure Trips - K Reactors"

After the recent increase in K Reactor water flow rates, the calculated water pressure decay following BPA failure indicated that a Ball 3X drop could occur during this time with the LP and VLP settings then in use. To eliminate this possibility, the PCA specified new trip settings based on the calculated curve. A trip-out test to confirm the new trip settings is scheduled.

PCA #234 - "By-Pass of Panellit System - Cold Start-ups - KE Reactor"

All except the K Reactors are permitted by the Standards to achieve critical with the Panellit system by-passed. This procedure saves up to an hour of operating time because Panellit work and rod withdrawal can progress concurrently. The new Standards for the K Reactors, which incorporate this provision, are, for other reasons, not yet signed. The PCA confirmed verbal authorization given KE Reactor to use this method during cold start-ups. A procedure was specified.

PCA #235 - "Flux Monitor Inter-Tie By-Pass During Generator Testing"

The PCA was issued to extend the provisions of expiring PCA #224 which permitted bypassing the flux monitor inter-tie during reliability tests of the emergency generators. By-passing the inter-tie is necessary during the tests to prevent needless reactor outages.

PCA #236 - "Change of Half-Rod Location - KE Reactor"

The PCA was issued to extend the provisions of expiring PCA #204 which permitted KE Reactor to have five half-rods, rather than the normal four, during the current rod relocation program. The half-rods at KE Reactor are being relocated to improve flattening control.

PCA #237 - "Operational Charge-Discharge Facility - C Reactor"

The PCA confirmed verbal authorization given C Reactor to discharge heat generating material from the 112 tube Operational Charge-Discharge Facility without

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HW-52809

DEL

placing the special tube-outlet-temperature monitoring system in the reactor safety circuit. This monitoring is necessary only when charging during operation. Because the special charging machine has not yet been installed, these tubes can be charged during shutdown, only.

PCA #238 - "KER Process Tube Outlet Temperature - High Trip, KE Reactor"

The PCA provided relief from unnecessary reactor outages due to operation of the heat exchanger exit-temperature high trip on the KER loop. The original trip settings specified in the Standards were rather conservative pending accumulation of operating experience. At the conservative settings it was found that variations in the instrument supply voltage could cause spurious trips. The PCA permitted less restrictive settings, based on operating experience.

PCA #239 - "By-Passing of Panellit System During Cold Startup, KW Reactor"

The PCA provided the same provisions for KW Reactor that were allowed KE Reactor by PCA #234.

PCA #240 - "Temperature Monitoring During Start-Up - KW Reactor"

During the September 8 start-up at KW Reactor, the temperature sensing element on tube #1279 was found inoperative. Because the tube was charged during the outage, the Standards would normally require shut down and repair, which would result in a production loss and increased poison costs. However, the operating history of sensing elements in the affected tube pattern indicated that the element was most likely grounded by moisture, and past experience indicated that this condition would generally rectify itself after a brief operating period. Tube pressure and flow were indicated normal. Verbal authorization was given to allow KW Reactor to continue operating with the apparently temporarily inoperative element. The sensing element became operable about two hours after start-up. PCA #240 confirmed this authorization.

Process Assistance

The Process Standards auditing program continued with one Engineer providing periodic coverage of all standard Processing Operation shifts.

Graphics services were provided for Operational Physics Operation, HLO, Irradiation Testing Operation, D-DR Power Operation, D-DR Reactor Operation, Component Testing Operation, Process and Reactor Development Operation, and the Process Technology Operation.

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>
9-2-57	2386-C	TK-608	8" Reg. (1)	388	Unclassified
9-2-57	2472-C	TA-114	8" Reg. (1)	384	Split L.
9-2-57	1780-D	C-251	8" Reg. (2)	471	Side H.S.
9-5-57	2879-DR	Z-343	8" Repr. (2)	386	Side H.S.
9-5-57	1571-C	TK-521	8" Reg. (1)	395	Side H.S.
9-6-57	2476-KW	A-136	8" Reg. (2)	212	Unclassified
9-11-57	2477-DR	A-149	8" Reg. (2)	188	Side H.S.
9-11-57	1467-D	A-136	8" Reg. (2)	229	N.A.
9-12-57	0775-F	Z-397	8" Repr. (2)	137	N.A.
9-15-57	0874-B	A-166	8" Reg.	59	Side H.S.
9-16-57	2780-C	Z-312	8" Repr.	453	Side H.S.
9-18-57	2476-B	A-107	8" Reg.	473	Split L.
9-19-57	4058-F	K-596	8" Reg.	319	N.A.
9-26-57	1965-C	—	8" I&E (3)	2186	N.A.
9-27-57	1170-B	C-257	8" Reg.	398	Side Other
9-28-57	1858-H	C-270	8" Reg.	267	Split L.
9-29-57	1168-H	A-134	8" Reg.	352	Split L.
9-29-57	1264-H	C-242	8" Reg.	362	Split L.
9-29-57	1665-H	A-103	8" Reg.	392	Split L.
9-29-57	2956-H	Z-357	8" Repr.	344	Split L.
8-8-57	2391-KW ⁽⁴⁾	—	Doe	38.6 ⁽⁵⁾	Mechanical Damage (Chattering)
8-8-57	5254-KW ⁽⁴⁾	—	Doe	25.7 ⁽⁵⁾	Mechanical Damage (Chattering)

- (1) Small Button Design Truline.
- (2) Hunter-Douglas Cans.
- (3) 1.44 per cent Enriched Uranium - PT-IP-1A.
- (4) Previously unreported. Ruptures recently confirmed.
- (5) Percent U²³⁵ Depletion of Doe Metal in the Column.

Legend:

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

Split - Slug split longitudinally (L), diagonally (D), or transversely (T).

Unclassified - Failure does not fit into any particular category.

N.A. - Information not available.

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HW-52809

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OPERATIONAL PHYSICS OPERATIONPILE PHYSICS ASSISTANCE

A thorough review of recent KE operating records by the pile physicist and process engineer does not reveal any one incident which could definitely have caused the August rupture outbreak. It is conceivable, however, that the one period of non-standard operation observed - following the start-up of August 12 - could be associated with the ruptures. Shifts in temperature balance and compensating control rod movements probably resulted in some tubes exceeding the normal rupture control point by 4 to 8%. More rigorous start-up measures have been put into effect at the K piles during the last month to prevent such excesses from occurring in the future.

Table I lists operational items of physics interest from all the piles during the reporting period.

TABLE I

SUMMARY OF OPERATING DATA OF PHYSICS INTEREST FOR
THE REPORT PERIOD OF SEPTEMBER 1957

Pile	<u>B</u>	<u>C</u>	<u>D</u>	<u>DR</u>	<u>F</u>	<u>H</u>	<u>KE</u>	<u>KW</u>
ECT in Sept.*	1395	1640	1420	1480	1450	1495	2410	2370
12 Mo. Avg. ECT	1330	1595	1390	1440	1350	1547	2380	2410
Equil. Scram Time**	25-30	22-25	15-20	25-30	25-30	50-65	22-26	16-20
No. of Scrams and Recoveries#	2/2	2/2	0/0	0/0	3/3	0/0	4/4	0/0
	2/2	2/2	2/2	0/0	2/0	3/3	0/0	2/0
No. of Non-Scram Outages##	3/0	5/0	3/1	2/1	3/0	2/0	5/0	4/0

* Effective Central Tubes; this value is defined as the pile power divided by the average of the ten most productive tubes in the pile.

** This is defined as the maximum time available in minutes between scram and the first indication of start-up.

The first pair of numbers indicates the number of brief outages from which secondary cold start-ups would be made and the number of successful start-ups. The second pair indicates the number of brief outages from which hot start-ups would be made - and the number of successful recoveries.

The first number indicates the number of ordinary outages, and the second number indicates the number of additional outages to discharge temporary poison.

PILE PHYSICS ASSISTANCE (Continued)B Pile - W. R. Smit

Power level at B Pile has been limited by a bulk outlet temperature limit which reduces the incentive for flattening; however, the ECT value has been adequate to insure operation on this limit within the rupture control point. Efforts to maintain a flux distribution skewed toward the front to encourage graphite annealing have continued; they have been moderately successful.

Instrument people have been doing extensive work on the galvanometers and the PC. Rework of the galvanometer system has been something less than satisfactory as an instrument sensitivity check showed their sensitivity to be 12 kw. Improper PC operation was corrected by replacing a weak tube and replacing the PC chamber; the resulting sensitivity was 5 watts. The #2 Beckman on bucking voltage also has a 5 watt sensitivity; therefore, Process Standards allow start-up even if the PC is not working.

During the month of August an apparent hot spot caused 3 ruptures, and 17 rupture suspect tubes were discharged at that time. No additional ruptures have come from the suspect area; apparently all rupture prone material was discharged.

C Pile - F. C. Franklin

The number of tubes charged with production uranium I & E slugs increased from approximately 400 to approximately 630 this month. Although data uncertainties preclude breaking down I & E reactivity effects into cold values and coefficient effects, the hot operating reactivity status agrees quite well with predictions.

The transition from "C" to "E" metal has reduced the number of "C" metal columns from 64 to 59 this month. Compensation for the reduction in "C" metal tubes, for "C" metal burnout, and for the increase in I & E charges has increased the number of "E" metal tubes from 22 to 57.

The rod calibration test for C Pile was expected to occur on October 2, 1957, but an unscheduled outage on 9-26-57 has caused a postponement of probably about two weeks.

The addition of two poison columns has improved the flattening and helped stabilize the equilibrium flux distribution.

Five outages occurred between 8-25 and 9-23-57 because of production uranium slug ruptures. Three of these ruptures, including two in the Operational Charge-Discharge (OCD) zone, were stuck. One additional production uranium slug rupture was removed by the quickie technique during a short outage. One short outage was caused by a suspect I & E rupture; visual examination of the slugs failed to confirm a rupture. The tube involved was in the OCD zone and the charge was flushed out after the pile was shut down. One scram was caused when a safety circuit relay was inadvertently opened at the 151-B Building and one scram was caused by the panellit ground detector; recoveries were successful in both cases.

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

The 54 ton metal discharge taken during the outage of 9-11-57 reduced the flux squared weighted residual exposure ($\bar{E}$) of uranium load to an all time low of 155. Reactivity evaluations made before the shutdown indicated that the reactivity loss resulting from the discharge would cause large reductions in power level and flattening efficiency (about 10-15%) unless sizeable reactivity compensation was made. Fourteen additional "E" metal tubes were charged, bringing the total enrichment inventory to 5 "C" and 36 "E" with a total reactivity value of 130 ih. Five PCCF tubes were surrendered to uranium during the outage leaving in service only 11 out of the 24 originally installed. Reactivity evaluation at the subsequent equilibrium indicated that the pile reactivity was decreased even more than was anticipated, and the reactivity held in rods (215-220 ih) at equilibrium during the operating period was barely enough for control. Any further reactivity loss would likely have resulted in loss of control at the existing power level.

D Reactor was scrammed twice shortly after turn-around on 8-27-57. The first scram was caused by a panellit trip, and the second by a rear cap blowing off. Hot start-up techniques were used during both recoveries.

Splines were used for a portion of the start-up control during the start-up of 9-4-57. Although the splines which were inserted caused the expected poisoning and flux distribution effects, mechanical difficulties in their insertion made their charging rate too low for normal use. Facilities Engineering is continuing development work on mechanical aspects. Removal of the splines after turn-around was accomplished without difficulty.

No. 5 rod was tied out of service during the start-up of 9-4-57 because it did not work reliably. It has since been repaired and returned to service. No. 2 rod stuck at various positions during the first two operating periods of the report period. The difficulty was located and removed.

The fringe enrichment load at D Reactor causes severe flux distortions during start-up reactivity transients. The distortions make it difficult to predict the start-up reactivity transients accurately. Reactivity data from applicable start-ups have been analyzed in an attempt to improve the prediction accuracy. The results of the analyses were:

<u>CONDITION</u>	<u>IH/PCCF COLUMN</u>	<u>IH/"P" COLUMN</u>
	<u>(Δ FROM H₂O to PbCd)</u>	<u>(Δ FROM 32 HM to PbCd)</u>
1st Indication	15	30
Near Turn-Around	11	40

DR Pile - R. D. Carter

Two unscheduled outages occurred during the report period, both caused by slug ruptures in Hunter-Douglas material; both required minimum outages.

No equilibrium scrams have occurred at DR since 6-11-57, and operation during September has been gratifyingly free from non-routine disturbances.

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

Eight additional PCCF tubes were activated during the month, making a total of 24 in the unit. Ten "E" columns were added to compensate partially for the reactivity loss due to the PCCF addition. Twelve more "E"'s are planned for charging in the near future, as weighted residual exposure drops due to expected discharges. Twenty-two "E" columns will "pay" for the additional eight ball valves charged with solid aluminum; therefore, the normal amount of flattening can be maintained. The PCCF tubes were installed in line with the extensive tube replacement program presently in force at F Reactor. The total system strength will allow start-ups from the expected series of 60-hour-plus outages without an accompanying poison discharge in the majority of cases.

PCCF operation has been good during the month. Operations were able to discharge 24 full loadings from the system in slightly more than 2 shifts at a power level of about 1000.

The charge-displacement program is about 2/3 complete. A flux traverse during September indicates a definite skewing of the flux toward the front of the unit as compared to a traverse taken before the program. It is hoped that, by charging one additional uranium slug in each tube below 36 row and operating primarily with downstream rods, the flux shift will be sufficient to alleviate the graphite bowing which presently hampers charge-discharge in some tubes.

H Pile - G. R. Gallagher

Considerable graphite temperature cycling was experienced after the scram of 9-11-57. The cycle was started when the tube power distribution was allowed to shift toward the top during the hot start-up. Compensating efforts aggravated the situation by shifting the distribution to the bottom, thus starting considerable top to bottom cycling. The cycling continued for the duration of the operating period, resulting in non-optimum operation.

A scram was experienced on 9-3 due to a 190 pump dropping off the line; successful recovery was made in 23 minutes. On 9-4 a power failure caused a scram from which recovery was made in 15 minutes. During routine "rolling" of panellit gauges on 9-11-57 the reactor was scrammed when the wrong toggle valve was opened as a Heise check was attempted; first indication was reached 19 minutes after the scram. A broken rear pigtail on tube #1668 caused a scram on 9-21-57. Since the reactor was scheduled down on 9-22-57 no attempt was made for recovery.

Every shift has been informed on the use of the new HCR calibrations and scram curves. The new procedures will be used routinely in the control room from now on. Information meetings with the shifts are being well received and will continue.

KE Pile - W. S. Nechodom and D. T. Houser

The reactor was shut down on September 4 when maximum permissible graphite temperature limits were exceeded. The excessive graphite temperatures resulted from a flux shift to the far-side which could not be corrected due to lack of near-side reactivity and control. This lack of reactivity stemmed from the discharge of large quantities of metal during August to reduce rupture frequency. The unbalanced

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PILE PHYSICS ASSISTANCE (Continued)KE Pile - W. S. Nechodom and D. T. Houser (cont.)

reactivity condition was corrected partially during the outage by the addition of enrichment on the near side. After start-up the flux was deliberately maintained distorted toward the far-side to ensure adequate near-side control and to forestall any shift toward the far-side. This procedure resulted in an extremely smooth period of operation with essentially no tube power distribution or reactivity cycling, although a tendency to cycle was ever-present and required close watching and tight control measures.

The reactor was shut down on September 19 for a scheduled outage. During this outage approximately 40 additional inhours of enrichment were added to the near-side to further correct the distorted flux and reactivity condition which was caused by the discharges in August. As a result of this addition the ECT value increased from 2200 to approximately 2400. The addition of this enrichment resulted in exceeding the base enrichment limit, and a Process Change Authorization was necessary to permit compensation of the excess enrichment with HCR's for disaster control.

During September hot start-ups at KE Reactor have been limited by the following additional restrictions proposed by Pile Physics and accepted by the Reactor Manager.

1. Rate of rise is limited to 25 MW/minute on all start-ups.
2. Maximum tube-powers limited to approximately 1000 kw after any recovery until released by the Physicist.
3. Minimum reactivity held in HCR's at first indication on a hot start-up limited to 350 ih to insure adequate control at recovery level.

These restrictions will probably be slowly relaxed as operating experience indicates that no operating problems will result.

During the outage of August 28 a quantity of balls were drained from Channel 33. The exact quantity is not known but is estimated as "essentially a full channel". These balls exhibited high radiation readings and apparently had been in the channel since the total ball 3X drop on August 18. Reactivity data gathered at start-up criticals during the non-equilibrium period when these balls were in the reactor, compared with data taken both before the drop and after removal, indicate they caused a reactivity loss in excess of 100 inhours. The channel is located on the near side of the reactor two lattice units outside the enrichment ring and just forward of the pile centerline.

Investigation of Ball hopper 33 during the outage of September 19 disclosed a collection of balls which was retained at the top of the hopper around the probe after the ball drop of August 18. This collection completed the electrical circuit to the indicating light, and it was assumed that the hopper had not emptied. The collection was broken loose with a spline, and the hopper refilled and returned to service; it was estimated that only a "handful or two" of balls were around the probe.

PILE PHYSICS ASSISTANCE (Continued)KE Pile - W. S. Nechodom and D. T. Houser (cont.)

This incident has some safety implications in addition to the obvious operating problem. It is possible for a ball hopper (or several) to indicate that it is full and, therefore, "safe" when in fact there is no significant number of balls there.

HCR 16, one of the original "half-rods", has been removed and replaced with a full rod in preparation for installing a "half-rod" in HCR 3 position. This replacement will probably be accomplished within 2 months; this is the second change in half-rod location at KE Pile.

KW Pile - D. E. Goins and J. T. Worthington

Power levels were limited for most of the month by unstable reactivity conditions leading to tube power distribution cycling. Due to the large leakage rate of the reactor atmosphere, it was difficult to control the composition of the makeup gas. Reactivity fluctuations as high as 20 inhours occurred from the use of purging in attempts to maintain gas pressure and composition.

On September 17 it was necessary to obtain a Process Change Authorization in order to start up KW Reactor with an enrichment status slightly higher than that allowed by Process Standards. It was necessary to hold 30 inhours in the horizontal control rods at time of first indication as part of the safety system to preclude supercriticality in the event of water loss. As it turned out, no additional delay of start-up occurred due to approximately one hour required to withdraw #30 vertical rod.

Due to the recent rupture experience at KE Reactor, revised hot start-up procedures have been put into effect. The rate of power rise has been limited to 25 MW/min. Swapping rods for better control at turnaround has been abandoned since it might be a possible source of thermal shock which would cause slug failures.

Shift coverage by Operational Physics personnel was provided on two different occasions at KW Reactor to aid in controlling tube power distribution cycles. Both times, the cycling of the reactor was reduced.

Reactivity at KW Reactor has been below optimum for good control and flattening although enrichment limits have been reached. Cold clean reactivity is slowly increasing from the minimum experienced in August.

PROCESS PHYSICS STUDIESReactor Safety Studies

Both of the K piles now exceed the ball 3X enrichment limit, and thus require an extension of approximately one hour in minimum downtime. A process change authorization permitting the "over" enrichment to be compensated by HCR's is to be replaced by a process standard in the near future.

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PROCESS PHYSICS STUDIES (Continued)Reactor Safety Studies (cont.)

Desk calculations of safety buckling problems are continuing in lieu of the analog computer which has been undergoing repair.

A test to measure the strength of a ball 3X column relative to a VSR at DR Pile is in rough draft form. A mock-up test in the test pile indicated that a DR, H, and C ball safety channel may be about 10% stronger than the corresponding VSR.

Flux distortions During Scram Recoveries

A theoretical calculation of potential flux distortions following a scram in an old pile indicates that front to rear flux peaking of up to but probably not greater than 13% in excess of a cosine maximum may be caused by use of distorted rod configurations.

HCR Calibration Studies

The test for calibrating C pile rods, PT-IP-108-C, has been approved, and it is expected that it will be carried out during October. Instrumentation and operations shift information arrangements have been completed, and Operational Physics shift schedules have been made up.

The final report on the H Pile calibration test made in January has been sent to Technical Publications.

The recent Los Alamos work indicating revised delayed neutron half lives has been reviewed for its impact on our operations. Although the relations between delta k and inhours will be changed by possibly 20%, the use of the present delayed neutron values should not get us into safety difficulties if we are consistent. As long as the rods are calibrated by period techniques, potential excursions can be estimated correctly even if there is a conversion into and back from a false inhour equation in between. A study will be made to determine the difficulties of correcting all of our reactivity evaluations simultaneously for the revised inhour evaluations; fortunately, period data are still available from C and K Pile start-ups and from the rod calibration tests at DR, H, and KW. In the meantime we will avoid confusion by using the existing inhour equation and existing start-up evaluations.

Supplementary Control Studies

An initial small scale spline start-up test at D Pile during the month was successful in demonstrating poisoning and flux distribution effects, but mechanical problems limited their usefulness. The test was encouraging in that no panellit setting nor spline removal difficulties were encountered. Facilities Engineering Operation is continuing to work on methods for inserting the splines more easily.

A schedule has been drawn up by Facilities Engineering with concurrence by Operational Physics for breaking into the use of splines at the eight reactors in the following order: D, KE, KW, C, F, DR, B, and H. Full scale use should start in December; it is hoped that the transition could be accomplished at all reactors in the spring of 1958.

PROCESS PHYSICS STUDIES (Continued)

Supplementary Control Studies (cont.)

A winch displacement facility utilizing I and E slugs is expected to be ready for K Pile trial by FEO in the near future. This type column with a partial uranium charge centered by perfs or I & E poison pieces would appear attractive for controlling front to rear cycling.

E Metal Availability

With the use of shortened enrichment columns centered with natural uranium, it has been possible to meet basic reactivity and shield requirements and to continue to build a workable inventory of E metal. The situation has been more favorable than might have been expected as no ruptures have occurred to date in E columns loaded in the E for C and fringe protection programs.

Shield Protection Status

The DR and H shields are protected by poison to the extent that the side shields are below 100 C and the top shields below 150 C. The unpoisoned top and side shields of the D and F Piles have been running below 120 C. The B Pile side and top shields have been at higher temperatures, primarily because of the high temperature graphite annealing test. The B top fringe poison row, now with poison in alternate tubes, will be filled in solid during the next outage to reduce top shield temperatures from their present 165 C maximum. A production test loading utilizing depleted uranium is awaiting reactor downtime for loading in the farside of the B Pile where shield temperatures of 135 C are now being observed.

The development test for utilization of the neutron detector facilities installed under CG-558 has been signed, and foil activity data from each of the five older reactors are being received routinely.

The Thermal Hydraulics study in HLO on the top shield heating problem is inconclusive; too many uncertain assumptions have to be made to permit an exact explanation of temperature distributions found in the shields. They think that it would be possible to maintain surface (not necessarily maximum) temperatures at 100 C by recirculating the entire pile atmosphere through the VSR openings; the practicality of this scheme has not been evaluated.

Potential Gains Data

Equilibrium losses at the older piles continued to be quite small. The larger losses at the K's reflect temperature cycling difficulties, brought about in part at KE by the block discharges of rupture-prone material and in part by low excess in rods. The degree of radial enrichment at the C and H Reactors has dropped back somewhat in the past few months.

Large non-equilibrium losses at KE again resulted from the large number of start-ups due to rupture outages. D start-up losses have been more severe because of the large amount of fringe enrichment loaded there relative to HCR and ball-valve system control capacities.

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PROCESS PHYSICS STUDIES (Continued)

Potential Gains Data (cont.)

POTENTIAL GAINS - OPERATIONAL PHYSICS ASPECTS AUGUST 16, 1957 THROUGH SEPTEMBER 15, 1957

Reactor	B	C	D	DR	F	H	KE	KW	AVERAGE
Equil. Pot. With Existing Limits	2.0	6.6	0	0	0.6	6.4	8.0	5.8	4.5
Non-Equil. Potential									
Operating	4.2	4.5	7.5	3.7	4.0	2.4	13.3	6.4	6.7
Temp. "P" Outages	0.0	0.0	0.8	0.5	0.7	0.0	0.8	0.0	0.4
Total: Non-Equil.	4.2	4.5	8.3	4.2	4.7	2.4	14.1	6.4	7.1

Significant Operational Physics Documents Issued During the Month

- HW-51856, Chapter I, "IPD Physics Primer, Structure of the Atom", E. H. Lockwood, Unclassified.
- HW-51723, "Interim Report - Operational Physics Aspects of PT-IP-14-AC - Use of E Metal In Shield Protection", W. L. Bunch, September 18, 1957.
- HW-52289, "Reactivity Balance and Associated Reactor Physics Data, August, 1957", S. B. Stamp, September 4, 1957.
- HW-52311, "PT-IP-109-AC, Preliminary Irradiation of E Metal In I and E Form at C and the K Reactors", G. F. Owsley and L. W. Lang, August 30, 1957.
- HW-52393, "3X Capacity Calculations for DR, H, and K - Unbalanced Enrichment", J. R. Peterson, September 9, 1957.
- HW-52422, "Axial Flux Distortions During Scram Recoveries", C. L. Miller, September 10, 1957.
- HW-52746, "Operational Physics and Process Engineering Quarterly Forecast for F Reactor, October Through December, 1957", C. E. Bowers and S. M. Graves, September 23, 1957.
- HW-52747, "Operational Physics and Process Engineering Quarterly Forecast for H Reactor, October Through December 1957", October 1, 1957, G. R. Gallagher and D. L. Moore.
- HW-52749, "Operational Physics and Process Engineering Quarterly Forecast for KW Reactor, October Through December 1957", J. T. Worthington and R. E. Hall, October 1, 1957.

IRRADIATION TESTING OPERATION**DECLASSIFIED**
WITH DELETIONSKAPL-120 LOOP

The Loop has been on process water cooling without fuel elements during the month of September. Charging of the Westinghouse fuel train has been delayed until the October outage because of the following: 1) the fuel element thermocouple assembly was not complete when received, 2) the control rod test coupons were not firmly attached to the fuel assembly, and 3) a stainless steel fuel container (flow tube) had to be fabricated.

The following activities are in preparation for charging:

1. A final check of the heat generation in the fuel assembly revealed that the specific power of the adjacent process tubes would raise faster and higher than had been previously predicted; thus, the heat generation in the test assembly would exceed the capacity of the Loop. A P-3 thermal flux calculation was performed using the IBM 650 computer to establish the dimensions of a substitute (for zircaloy-2) stainless steel flow tube which would effect the necessary reduction in flux. From this calculation a flow tube was designed and successfully fabricated of stainless steel. The fabrication was completed on schedule by HLO's Technical Shops. Because of the greatly increased weight of the test assembly, a complete mock-up of the discharge was done during the September outage of H reactor.
3. The swimming pool (KAPL-120 basin) has been cleaned and painted.
5. The x-raying of the welds has been completed.

The document relative to code compliance intent has been delayed and is awaiting a complete evaluation of the radiographs of the welds.

100 DR RECIRCULATING GAS LOOP

Vendor bids for supplying the filters, the heat exchanger, and the pre-heater have been received.

The various quotations on the filters revealed that a considerable savings could be realized if the filter shells and the filter media were purchased separately and the filter bed packed under the supervision of Hanford personnel. New bids have been requested on this basis.

The heat exchanger order has been placed with the Stearns Rogers Company. A detailed analysis of the stresses arising from the steep thermal gradients in certain portions of the exchanger has dictated the use of Inconel.

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The various quotations for supplying the pre-heater are currently being reviewed.

The construction of the outside facilities (to be done under a lump-sum contract) will be delayed until spring to avoid the added cost which can be anticipated if the contractor is forced to consider cold weather contingencies.

EFFECT OF IRRADIATION TESTING UPON PRODUCTION

A report (HW-52495) was prepared for transmittal to AEC-HOO concerning the effect of Special Request activities upon production. The report represents the first step toward providing a routine accounting (requested by HOO) of the impact upon production of all testing activities.

The following bases were used in evaluating the costs resulting from uranium displacement, the neutron absorption of samples and in-pile test facilities, and from interference with operation:

1. Direct Production Loss - expressed in MWD and denoting the losses associated with reactor scrams, shutdown time, extensions of outages, and non-equilibrium operation.
2. Indirect Production Loss - the loss of production, expressed in MWD, and resulting from natural uranium being replaced by a sample.
3. Reactivity Effect - expressed as the number of E slugs, at normal goal exposure, required to replace the neutron absorption by the sample. It is assumed that the E metal enrichment supplies one thermal neutron for each thermal neutron absorbed by the sample or the irradiation facility. The enrichment burnup thus determined is reduced by the ratio of the adjacent tube power squared to the average maximum tube power squared in order to reflect true reactivity effect.

More definitive standards must be established for calculating the production losses and reactivity effects. An IPD task force has been organized to provide these standards and to specify the procedures for the gathering and analysing of field data for the report covering all irradiation testing activities.

NEUTRON FLUX STUDIES

The thermal neutron flux seen by irradiation tests in the pile is obtained by taking a product of the average thermal flux in the adjacent uranium and the rise factor. The average thermal flux in the adjacent uranium is calculated from the power at which the uranium is operating. For a given uranium power this flux is inversely proportional to the amount of uranium present. The use of I & E slugs, having less uranium than solid slugs, will result in a higher thermal flux for a given power. Fluxes will be increased by the following factors:

Type of Pile	Flux Increase over Solid Slugs @ Similar Tube Power
Old Pile	1.08
C Pile	1.08
K Pile	1.08

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Indications are that the smaller rise factors associated with I & E slugs will approximately compensate for the increased adjacent flux. This leaves the average flux in the irradiation test approximately the same for adjacent I & E slugs as for adjacent solid slugs operating at a similar power.

HAPO FUEL ELEMENT IRRADIATIONS

In support of the I & E fuel element development program (HAPO-159) the water stream temperatures of four (4) process tubes in D reactor and 16 process tubes in C reactor are being monitored.

Two 2.1 inch I.D. inner tubes, designed to provide irradiation space for full tube charge of large diameter fuel elements (candidate I.P.R. slugs) are ready for installation in K reactor front to rear test holes.

OTHER IRRADIATION TESTS

1. A total of ten sets of activation analysis samples (HAPO-184) were irradiated in the Poison Column Control facilities in support of a Washington Designated Program assigned to HLO.
2. One sample of UO_3 (HAPO-203) was irradiated in the Quickie Facility (E Test Hole) at 105 F to provide a Np^{239} tracer in support of a HLO chemical separations study.
3. Ten thermocouples were installed in the 36 inch Shield Plug facility (X Test Hole) at C pile in support of a shielding study program being conducted by HLO.
4. Two charges (trains 1 and 2) of special slugs (WAPD-114-A) containing canned uranium oxide fuel in a NaK bath were discharged from B pile.
5. The following activities were carried out in support of the Radioisotopes Distribution Program:
 - a. Seventeen isotope samples were charged into and five discharged (and shipped) from the 2D test hole at KW pile.
 - b. One tube of CO^{60} (ORNL-183) was discharged from D pile. These pieces have a calculated activity of 31,000 curies. This tube also contained 15 Be_3N_2 (ORNL-184) pieces as spacer material which will be recharged.
6. Eighteen baskets began exposure and sixteen baskets completed exposure in the Hanford (KE) gamma facilities.
7. Seventeen AF-100 canisters began exposure and fifteen canisters completed exposure in the Air Force Gamma Facilities (KE).
8. The development test which authorizes the irradiation of various thermocouples in various atmospheres (HAPO-199) has been approved. The first phase of this test will be an irradiation of the thermocouple leads only. The start of this test is tentatively scheduled for October.

TEST FACILITIES

The ORA Loop (HAPO-182) was removed from the 2A General Purpose facility (KE reactor). Because of a spread of contamination which occurred during removal, it was not possible to install the replacement loop or effect planned repairs to the facility inner tube. This work will be done during the next outage. The contamination spread did not interfere with the scheduled start-up of the reactor.

The pressure reducing valve and controller which supplies process water at 150 psi to the side test holes and the foundation cooling system at KE reactor was inspected following a malfunction which occurred September 13. The controller was found to be in good condition. The valve seat was badly wire drawn. The downstream pressure sensing line was plugged. Repairs were made and the system returned to normal service. The cause of the plugged sensing line is not yet known. A similar valve at KW reactor is scheduled for inspection during the October outage. The assistance of the K plant Maintenance Engineering Operation has been obtained in solving the wire drawing problem.

The fabrication of the Hanford Cobalt Facility is 90 per cent complete.

Installation of various components to enhance the safety and reliability of operation of the 36 inch Shield Plug facility at C reactor is 30 per cent complete.

BORESCOPING

VSR Channel # 27, F pile, was borescoped on 9-9-57, to determine the cause of the rod sticking at 12 feet down. Examination revealed that the channel was bowed towards the far side of the unit to a degree which caused the rod to bind against the channel at approximately 11-12 feet down from the top of the ball hopper. At 20 feet down the rod was scraping the opposite side of the channel causing the rod to bend into a slight "S" shape. The channel otherwise appeared to be in fair condition.

Process Tube Channel # 0873-B was borescoped on 9-5-57, before and after broaching, in an effort to determine the effect of the broaching operation upon the graphite.

A splitter had previously been stuck in this channel at approximately 11 feet from the front vanstone. The following observations were made during the "before" inspection:

1. Tube entry block was gouged to a depth of approximately 1/8" on both sides by the splitter; however, the block was not cracked.
2. Block Numbers 2 and 3 (11 to 19 feet) were cracked lengthwise.
3. Block Number 4 (19 to 23 feet) showed signs of corrosion as might be expected from a water leak. A 1-1/4" separation was noted between Blocks 4 and 5.
4. Block Number 5 was satisfactory.

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5. Block Number 6 was cracked lengthwise from downstream end to center of block.
6. Block Number 7 was satisfactory.

The inspection after broaching revealed the following changes in the channel:

1. The broach removed all corrosion products from the channel.
2. The gap between Blocks 4 and 5 increased to 1-1/2".
3. A gap of 1/2" was noted between Blocks 5 and 6.

A summary of the results of vertical bowing measurements follows. All distances are measured from the front vanstone.

Area	Date	Tube	Results
105-B	9-5-57	4454-B	Down .06 inch at 10' since 5-10-57
		D	Down .14 inch at 20' since 5-10-57
105-B	9-5-57	4574-B	Down .06 inch at 10' since 7-3-57
			Down .12 inch at 22' since 7-3-57
105-B	9-5-57	4391-B	Down .06 inch at 10' since 5-10-57
			Down .19 inch at 20' since 5-10-57
105-F	9-9-57	4676-F	Down .09 inch at 10' since 12-20-56
			Down .14 inch at 20' since 12-20-56

COOLANT TESTING OPERATION

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

1706-KE SINGLE PASS TUBES

Operation of the six central zone single pass tubes with weighed regular production slugs continued under established programs. The tubes were operated in pairs at pH's of 6.0, 6.5 and 7.0. For three days during the month .001 ppm of arsenic were injected into the water supply for Tube 4963, to determine the radioactivity pick-up for studies on the contamination of downriver water systems.

The test for the radiation effects on corrosion rates in high temperature pre-heated (90°C) water, in Tube 2943, was completed on 9-26-57 and the charge was removed. A new charge, consisting of lead cored dummies containing gold foils, was installed. The addition of pre-heated water to this tube will not be initiated until repairs to the inlet heat exchanger can be accomplished.

MOCK-UP TUBES

During the month programs were continued for the determination of corrosion rates for M-388 and carbon steel in low temperature 6.5 - 7.0 pH process water, the determination of corrosion rates for self-supporting slugs with flexible rails, the determination of the effects of Turco as a tube decontaminant and the determination of the effects of metallic inclusions on the overall and localized corrosion of aluminum.

ELMO LOOPS

ELMO-1 - ELMO-1 was operated intermittently during September for studies on the rate of scale build-up in recirculation system heat exchangers cooled with untreated Columbia River water.

ELMO-2 - Continued to be operated with phosphoric acid addition at 180°C and a pH of 4.0 to obtain information on corrosion of aluminum and sensitized stainless steel under low pH conditions. Preliminary results indicate low corrosion rates on the aluminum and no intergranular corrosion on the stainless steel specimens.

ELMO-5 - During the early part of September, tests at 290°C and a pH of 9.0, with the addition of 5-7 ppm of silica, indicated low corrosion rates on carbon steel, stainless steel and Zircaloy-2, but resulted in corrosion rates of 10-12 mils per month on M-388 aluminum and considerable pitting and erosion of the samples. On 9-26-57 a new test, with 250 ppm of silica, was initiated.

ELMO-6 - ELMO-6 continued to be utilized for aluminum alloy corrosion tests in high temperature (300°C) water during the month. Tests were performed with 150 ppm of phosphate at a pH of 4.5.

ELMO-7 - Was operated for the purpose of testing KER fuel elements, welded KER tube sections, an ETR nozzle and a Barco pigtail during the month.

ELMO-9 - A new test, using 250°C water, at a pH of 4.0, with phosphoric acid addition, was initiated during the month. Corrosion rates for aluminum test specimens and sensitized stainless steel specimens appear to be favorable.

KER FACILITY

LOOP #1 - Planning for the restoration of Loop #1 to high temperature - high pressure water recirculation service was initiated during the month.

LOOP #2 - In-pile recirculation of Loop #2 with M-388 jacketed, collapsible rail, large diameter internally and externally cooled slugs (cows) continued during the month at 180°C outlet temperatures. Phosphoric acid was used to regulate the pH at 4.5.

LOOP #3 - Replacement and testing of the #2 pump in Loop #3 was completed during the early part of the month and the loop was charged with stainless steel jacketed cluster elements on 9-19-57. The loop was operated at minimum temperature until 9-26-57 because of difficulties with the outlet temperature instrumentation. Repairs were completed on that date and the increase to operating temperature was initiated. On 9-29-57 it was necessary to again reduce the loop temperature to the minimum because of a failure of the #1 pump in Loop #3. The pump was shutdown because of a high temperature cooling water trip and the loop conditions were reduced to those required for one pump operation. This was the sixth KER pump failure.

LOOP #4 - Operation of Loop #4 with M-388 jacketed, collapsible rail, large diameter, internally and externally cooled uranium slugs (cows) continued during the month at 200°C outlet water temperatures. Phosphoric acid was used to regulate the pH of the coolant at 4.5.

KER IMPROVEMENTS - There were no incidents caused by Coolant Testing Operation activities which resulted in an interruption of KE production during September. During the outage of 9-19-57 the KER safety circuit was revised to reduce the number of single series contacts from eleven to five. Modifications including paralleling of the pump Δ P contacts, placing the boiling point suppression contacts in parallel with a series circuit containing the exit temperature and exit pressure contacts, and removal of the process water back-up valve safety circuit contact.

ORGANIC COOLANT TEST PROGRAM

ORA-1 - ORA-1 was operated for 220 hours, at 270°C and 150 psi, during the early part of the month, for testing of various kinds of fuel elements. A new test at 370° was initiated on 9-20-57 but was discontinued because of a bearing failure and a gasket failure which resulted in a leak of organic vapor into the loop room. Repairs are in progress at month end.

ORA-2 - The in-pile portion of the loop was removed and replaced during the month and operation was resumed on 9-28-57. The loop contains a tertiary eutectic consisting of 25% biphenyl, 20% meta-terphenyl, and 55% ortho-terphenyl.

ORA-3 - ORA-3 continued to be operated for tests on Barco pigtails. During one test at 150 psi the temperature was cycled from 20°C to 275°C 90 times. The ball joints on the pigtail leaked slightly all during the test.

COMPONENT TESTING OPERATION**DECLASSIFIED**IRRADIATED MATERIAL EXAMINATION

Detailed examination of the following 47 tubes of production test material was completed during the month.

<u>Production Test Number</u>	<u>Number Tubes</u>	<u>Production Test Number</u>	<u>Number Tubes</u>
IP-19A	2	IP-30A	7
IP-43A	15	IP-44A	1
IP-45A	1	IP-51A	1
IP-56A	10	IP-59A	2
588A	2	601A	1
631A	4		

PROCESS TUBE CORROSION MONITORING PROGRAM

Fifteen process tubes were examined in basin facilities and nine tubes were measured in the Metallurgical Laboratory. Three tubes from F Reactor which Probolog measurements had indicated severe external corrosion were removed, examined and measured in the Metallurgical Laboratory. These tubes were in severe condition due to external corrosion adjacent to the rear gun barrel. Pits were found measuring 52 mils maximum which left only an 8 mil remaining wall thickness. A front pigtail connector from Tube 5163-KW was also examined, and it was found that the teflon liner contained a flaw which accounted for the fact that this connector was leaking.

In-pile measurements of 196 process tubes were completed using the Probolog instrument. B, H, and D Reactors are presently using Probolog results to determine which tubes should be removed. In addition the Probolog is used to check external corrosion at F Area.

Listed below are the number of tubes measured in-pile per reactor and the document number of the reports.

<u>Reactor</u>	<u>Number of Tubes</u>	<u>Document Number</u>	<u>Classification</u>
H	28	HW-52280	Unclassified
B	69	HW-52428	Unclassified
F	48	HW-52499	Unclassified
D	51	HW-52498	Unclassified

PANELLIT PROGRAM

Failure analysis was performed on 24 Panellit gauges and 731 gauges were process inspected and approved for installation.

A Panellit gauge manual (HW-51442, Unclassified) was issued during the month. The purpose of this manual is to provide a document listing standard parts for all Panellit gauges in all reactors to assist personnel concerned with maintenance and the procurement of component parts for Panellit gauges.

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 September 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

for R. L. Dickman
Manager, Research and Engineering
IRRADIATION PROCESSING DEPARTMENT

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PRODUCTION AND REACTOR OPERATIONS SUMMARY

SEPTEMBER, 1957

Input production (Pu) for September was 97.8 percent of forecast. Production was slightly below forecast due to low time operated efficiency resulting largely from slug ruptures. Output production was 80.9 percent of forecast due largely to poor operating continuity and the discharge of some rupture-prone material at below goal concentration.

The maximum established power levels were increased 45 megawatts at F, 30 at B and 25 at H. The increase at H was due to improved flattening. The B and F increases were due to operating at higher tube powers.

Forty-five reactor outages, of which 19 were scrams, resulted in an overall time operated efficiency of 77.9 percent. Forecast was 82 percent.

Twenty ruptures, 19 regular metal and one production test I & E slug (PT-IP-1A "Evaluation of I & E Slugs Operating at High Specific Powers") were removed from the reactors during September. Five of the regular metal ruptures were at H, four at C, three at B, two each at B, DR and F, and one at KW. The production test I & E rupture was at C Reactor. Four of the ruptures at H Reactor were attributable to a 24 percent over-powering of near-center tubes during a cold startup. To avoid further ruptures from these tubes, 30 tons of metal were scheduled for discharge on October 1 at approximately 50 percent goal concentration. Six ruptures of metal canned in Hunter-Douglas cans led to the discharge of 111 tons of this material (largely at D, DR, KE and KW reactors) at approximately 60 percent of goal concentration.

Significant items of equipment experience were: (1) seventy-seven process tubes were installed on the tube replacement program; 31 at B, 20 at H, 16 at D and ten at F. (2) Two process tube leaks, one at D and one at H, and one Van Stone leak at B were corrected. (3) New impellers and new type modified wearing rings were installed in two process pumps at 190-DR Building. (4) Additional leak tests of the DR far downcomer system failed to reveal leaks which were thought to be causing settlement of the far side of 105-DR Building. (5) A new, molded Hypalon seal was installed on the F Reactor downcomer. (6) Six rear face bellows gas leaks were corrected at F Reactor, which reduces gas loss approximately 1500 cubic feet per day. (7) Divers from McCray Marine Company completed an underwater inspection of the 181-H Building pump well and forebay. No removal of sand is planned at present since adequate channels are available at each end of the sand bar. (8) Gas consumption at KW Reactor continues to rise due to leaking rear face bellows.

IPD Disabling Injury No. 2 occurred September 3 at 105-D when a Processing Operation operator lost the tips of three fingers in a charging machine accident. There were no security violations or radiation over-exposures during September. Significant contamination to the discharge area and exhaust air in cells occurred at C Reactor when a ruptured production test I & E slug ignited during discharge. No significant deposition of radioactive particles was found in the area or surrounding vicinity.

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
SEPTEMBER, 1957

I. ORGANIZATION AND FUNCTIONS

No Change

II. PERSONNEL

A. Force Summary

	August 31			September 30			Net Change of Total
	<u>E.</u>	<u>N.E.</u>	<u>Total</u>	<u>E.</u>	<u>N.E.</u>	<u>Total</u>	
General	1	1	2	1	1	2	0
Plant Admin. Operation	3	2	5	3	2	5	0
B Processing Operation	9	35	44	9	35	44	0
C Processing Operation	8	31	39	8	31	39	0
Power Operation	14	109	123	14	107	121	-2
Rad. Mon. Operation	7	21	28	7	21	28	0
Maintenance Operation	23	120	143	23	119	142	-1
Total	65	319	384	65	316	381	-3

B. Movement of People

D. L. Allred, Supervisor-in-Training, Power Operation was promoted to Supervisor, 100 Power II effective September 1, 1957.

Nonexempt movements during September consisted of two transfers in, one reactivation, two transfers out, two terminations, one deactivation, and one promotion to the exempt roll.

III. PERSONNEL ACTIVITIES

Eleven exempt people attended IPD Exempt Employee Training classes during September; the classes included: Financial Operation Orientation, Labor Management Relations, Management Orientation, IPD Radiation Protection, Process Orientation, and the supervisory session of Dr. Conant's lecture on "Understanding People". Six exempt people attended September meetings of the Professional Business Management course.

IV. SAFETY AND SECURITY

There were 19 Medical Treatment and no Disabling Injuries reported during September. No security violations were incurred.

V. NON-ROUTINE REPORTS

1. HW-52474 - Radiological Protective Equipment Processing for IPD.
2. HW-52514 - IPD Radiation Occurrence, Investigation Report

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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 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

B-C PLANT ADMINISTRATION OPERATION

A. Administration Activities

Preliminary studies were made on the possible location of a central bus loading terminal within the area for use in conjunction with the proposed take-home type of badge. A tentative layout plan was submitted to Construction Engineering Operation for an estimate of probable costs.

Scheduled 1957 pre-retirement contacts were completed during September. All B-C people over 58 years of age received detailed information relative to optional and normal retirement programs.

Five IPD Power Operators (one in B-C) were released as a result of a six-man reduction of force in CPD. Placement (with FPD) was accomplished for the B-C employee only. The five remaining employees (four from IPD, one from R&U), were terminated for lack of work.

B. Personnel Development

The Manager Development Program continued during the month with completion of I. L. Huffman's five-meeting series on "Finished Work" and three of five meetings on "Union Relations" by F. F. Vlacil.

Scheduling of B-C employee attendance for fourth-quarter 1957 Exempt Employee Training Classes was completed.

C. Cost Control Activities

Charting of operating costs for the Level 4 components was 70 percent completed at month end.

D. Landlord Activities

A detailed inspection of the 185-B and 190-B Building walls was made on September 12 by Utilities Engineering. The inspection was requested as a result of the incident reported last month relative to a concrete block falling out of the 185-B wall.

Construction of the new parking lot located between the 1704 and 1707 Buildings was started and essentially completed, with the exception of painting in parking lanes and crosswalk boundaries. The additional area was needed due to the space limitations of the existing parking facility.

DECLASSIFIEDB PROCESSING OPERATIONA. Production

Input production (Pu) for September was 97.3 percent of forecast. Production was less than forecast primarily as a result of 10 unscheduled outages caused by two slug ruptures, a process tube water leak, and seven scrams. Operating levels were limited by bulk outlet water temperature and non-equilibrium operating conditions. The maximum established power level and daily production for B Reactor was increased 30 units above the previous highs established during August, 1957.

B. Operating Experience1. Operating Continuity

There were 10 unscheduled outages and one scheduled outage in September as follows:

<u>Date</u>	<u>Cause</u>	<u>Outage Hours</u>
9-2-57	Tube replacement outage	114.5
9-9-57	Panellit Scram (error in Heise method)	.2
9-15-57	Panellit Scram - Tube 0874-B	.3
9-15-57	Ruptured Slug in Tube 0874-B (stuck)	31.9
9-17-57	Panellit Scram (leaking toggle valve)	.8
9-17-57	B-C Intertie Scram (loose connection-DX Relay in 105-C)	.7
9-18-57	Ruptured Slug in Tube 2476-B (stuck)	25.7
9-25-57	Scram - No. 4 RXG Failure (tube failure)	.4
9-26-57	Water Leak - Tube 1092-B	29.0
9-30-57	B-C Intertie Scram (cause undetermined)	.3
9-30-57	Panellit Scram (incorrect unbypass procedure)	.1
Total Outage Hours		203.9

The reactor was shut down at 8:40 a.m. on September 26, 1957, to investigate water leak indications. Process tube 1092-B was found leaking at the rear Van Stone, which had sheared off. The tube was removed and the channel left empty. During the outage a rupture suspect (later confirmed) was removed from Tube 1170-B.

2. Equipment Experience

Of a total of 68 tubes probologged, 27 were removed due to thin wall considerations. Thirty-one tubes were installed, including four in empty channels. Two tubes removed were severely corroded externally.

C. Improvement Experience1. Production and Process Tests

a. PT-IP-A84MT, "Evaluation of M388 Slug Jackets", was discontinued.

2. Projects

Active projects at B Reactor were:

- a. CG-558, "Reactor Plant Modification for Increased Production".
- b. CG-666, "Zone Temperature Monitor".
- c. CG-669, "Water and Gas Leak Detection".
- d. CG-665, "Metal Loading Elevator".
- e. CG-583, "Moisture Monitor for Leaking Process Tubes".
- f. CG-684, "Adequate Fresh Air Systems".

D. Events Influencing Costs

1. Overtime Usage - No exempt and 155 nonexempt overtime hours were required at B Reactor in September.
2. Dummy Recovery - A program of recovering dummies from the burial ground trenches was inaugurated in September. Dummies were removed from a portion of one trench and were in the process of being sorted at month-end. Final results of savings to be gained have not been compiled.
3. Gas Usage - Gas consumption remained high despite continued efforts to locate and correct leaks. Gas pressure on the reactor was kept as low as possible consistent with reactor safety.

C PROCESSING OPERATION

A. Production

The C Reactor input production (Pu) for September was 96.9 percent of forecast. The operating control point was maintained at approximately 950kw tube power (average 10 hottest tubes) throughout September. The production was less than forecast as a result of seven unscheduled outages caused by ruptures and a faulty panellit gage.

B. Operating Experience

1. Operating Continuity

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

<u>Day</u>	<u>Cause</u>	<u>Outage Time</u>
1	Rupture (Tube 2488)	*13.6
2	Rupture (Tube 2386)	1.9
2	Rupture (Tube 2472)	31.0
4	Rupture Suspect (Tube 2470)	1.5
5	Rupture (Tube 1571)	32.8
16	Rupture (Tube 2780)	39.3
26	Rupture (Tube 1965)	81.3
30	Panellit Trip (Faulty Gage 2266)	2.2
	Total Outage Time	203.6

* Outage continued across previous month-end. Of the 29.5 total outage hours, 13.6 hours were in the month of September.

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Five ruptured slugs were experienced during September. Four of the ruptured slugs were stuck and forces exerted by the hydraulic pushing machine were required to remove the stuck slugs.

The ruptured slug in Tube 1965 was an enriched I & E slug charged run-to-rupture as authorized by Production Test IP-1-A. The ruptured slug was stuck in the process tube and a maximum force of 14,000 pounds exerted by the hydraulic pushing machine was required to remove the process tube and metal charge intact. During the removal of the process tube and metal charge the process tube broke at the location of the ruptured slug from the weight of the contained slugs. The ruptured slug ignited at the point the process tube broke and burned in the 105-C discharge area, resulting in gross contamination of the 105-C discharge area. (See Radiation Monitoring Operation Section of this report for contamination data).

Tube 2470, charged with 32 I & E slugs, was discharged as a result of rupture indications on both the crossheader effluent water monitor and the vertical column effluent water monitor. The tube was discharged using the operational charge-discharge console with the reactor down. Examination of each slug in the metal charge by the Component Testing Operation failed to confirm a ruptured slug.

2. Equipment Experience

B-C Intertie - B Reactor was scrambled as a result of a loose wire in Building 105-C on the B-C high level intertie circuit. The operation of C Reactor was not interrupted.

C. Improvement Experience

1. Production Tests

PT-IP-19A - Pilot Charging of I & E Fuel Elements - C Reactor - A total of 330 tubes was charged with I & E slugs and 72 tubes containing I & E slugs were discharged. At month's end there was a total of 806 tubes charged with regular I & E slugs. A total of 1467 overbored nozzles have been installed.

Tubes 1074 and 2160 were recharged following replacement (see PT-IP-42-A) as authorized by PT-IP-19A. Tube 1074 was charged with I & E slugs and a mixing slug. Tube 2160 was charged regular metal. Both tubes were equipped with an eight-point thermocouple train to evaluate the water temperature distribution in the annulus around the slug.

PT-IP-42A - Evaluation of General Corrosion Characteristic of Ni-Al Alloy M-388 Slug Jackets - Tubes 1074 and 2160, BDF-type tubes installed as authorized by this production test, were replaced with regular C-type tubes, terminating the test.

PT-105-543-SI - Irradiation Service Request - HAP0 180 - ORNL 184 The single tube charged with this production test was discharged, terminating the test.

PT-IP-87-I - (Supplement A) Evaluation of CG-651 Rupture Discharge Capabilities - One regular uranium slug with the can wall machined down to the Al-Si bonding in two spots was added to the downstream end of Tube 2075 as authorized by Supplement A of PT-IP-87-I.

PT-IP-43-A - Evaluation of the Uniform Corrosion Resistance of M-388 Alloy Slug Jackets - One tube charged with this production test was discharged, terminating the test.

PT-IP-1-A Evaluation of I & E Slugs Operating at High Specific Powers - Three tubes charged with enriched I & E slugs were discharged during September (see description of Tube 1965 under Operating Continuity), terminating the test.

2. Projects

Continuous Charge-Discharge C Pile Demonstration Unit - CG-651 - The necessary circuitry was completed to allow the pressure monitor to be placed in the reactor safety circuit during operational discharge of a metal column using the operational charge-discharge console.

3. Other

Rear Nozzle Inserts - Design Change - 170-C - The cutting of $1\frac{1}{4}$ " off the upstream end of the rear nozzle inserts as authorized by Design Change 170-C was continued throughout the month.

Effluent Line Vent - To eliminate one source of contamination, the vent stacks from the 105-C Building effluent lines to 107-C basin were removed and the necessary piping installed to vent the line in use to the line not being used.

Panellit - All gages on the pressure monitor (panellit) were adjusted during a reactor outage to allow reactor operation with a riser pressure of 365 psi. This will allow continuity of reactor operation with only eight process water pumps in service if required.

D. Events Influencing Cost

1. Overtime - A total of 461.2 man-hours nonexempt and no man-hours exempt overtime was required during the month.
2. Gas Use Reduction - The adoption of a check sheet and procedure to assure the reactor is operated with a minimum unit pressure resulted in a 50 percent reduction of gas used since mid-month.
3. Other - Seven unscheduled outages during the month resulted in 203.6 hours of down time.

B-C POWER OPERATION

A. Operating Experience

River water was of uniform good quality during the month; however, an excess alum feed of about 1 P.P.M. was required to control film build-up in the reactors.

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HW-52809

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Total flow through the 105-C Reactor has increased about 5,000 G.P.M. since I and E fuel elements have been replacing solid fuel elements. Ten process pump units have been required to maintain this increased flow during periods of high water temperature and low voltage on the B.P.A. system. Flow was decreased about 6,000 G.P.M. on September 30 so that nine pump operation in 190-C would be possible during the pump replacement program of Project CG-600.

B. Equipment Experience

190-B Annex - Number 2-A pump impeller was inspected on September 2, and found to have several holes through the suction vanes. The pump was re-assembled and returned to service, continuing the test run to destruction.

C. Improvement Experience

1. Projects

CG-558 - "Reactor Plant Modification For Increased Production" - Installation and testing of Power Loss Time Relays on all units was completed. By-pass lines on 190-B Annex pump discharge headers were completed on all units.

CG-600 - "100-C Alterations" - The No. 5-C river pump at 181-B, and the No. 3 process pump at 183-C were made available for service following completion of Acceptance Tests.

CG-650 - "Replacement of Valve Houses" - Phase II of this Project was completed and the final inspection made.

CG-714 - "Replacement of Steam Line Support Poles in the 100 Areas" - Phase II of this Project was completed and the final inspection was made.

CA-730 - "Power House Chimney Repairs" - The Boedecker Chimney Construction Company of Tacoma inspected the interior of No. 2 stack and found it in good condition. Repair and painting of the outside of No. 2 stack was completed and interior inspection and painting of No. 1 stack started.

D. Events Influencing Costs

1. Maintenance costs remained high due to the overhaul of the 184-B boilers.
2. The total overtime hours worked by B-C Power employees for September was 88 hours.

B-C RADIATION MONITORING OPERATION

A. Radiation Occurrences

A B-Processing Operator was contaminated on the left arm and cheek from back flow water while charging poison in a ball valve tube. His left arm was contaminated to 25 mrad/hr and left cheek to 6,000 c/m. His radiation exposure was minimized by expeditious removal of the contaminant.

Contamination survey of an employee following work in 105-B rear face indicated 60,000 c/m (35 mrad/hr uncorrected for source size on right temple). Decontamination was effected. Film studies of the removed speck indicated a maximum possible dose of 200 mrad to the skin of the right temple.

While leak testing a tube on the front face of the C Reactor, the leak tester blew out of the tube and sprayed an employee with water. His protective clothing was contaminated up to 6.5 rads/hr at the surface including 40 mr/hr at two inches. Skin contamination was limited to 500 c/m on the right side of the head. Prompt removal of the protective clothing restricted his exposure from this occurrence to 24 mrad. Skin contamination was readily removed.

An operator at 105-C contaminated his left wrist to 80,000 c/m - (30 mrad/hr at surface including 2 mr/hr at two inches) while cleaning and re-papering the 105-C 30' ready room. Skin area was decontaminated to less than 100 c/m. Maximum possible exposure was calculated to be 800 mrad to the skin of the man's wrist, which is within the weekly limit of 1500 mrad for hand exposures.

During the removal of a rupture from Tube 1965-C on September 27, the ruptured piece ignited while in the tube section exposed to the air in the discharge area. Approximately ten minutes elapsed before the section of tubing containing the rupture was discharged into the storage basin. As a result of the occurrence, the exhaust air duct flashing below vertical row 65 was contaminated to 500 rads/hr at a few inches. Exact location of the fragmentary particles was not determined due to limitations of the available instrumentation. This activity level was reduced to 30 r/hr at two inches by repeated water flushes. The exhaust air fans indicated dose rates to 400 mr/hr at six feet. Radiological condition of the exhaust air tunnel has not been determined.

Contamination surveys of the general B-C Area disclosed no significant deposition of radioactive particles from the exhaust air stack.

B. External Exposure Control

Charging of poison pieces in the B Reactor was accomplished with a dose rate to personnel of 50 mr/hr. It was necessary to use thirty-inch tongs to reduce radiation exposure rates to this level.

Pushing down of the discharge chutes in the B Reactor occasioned personnel dose rates to 500 mr/hr.

Work associated with ruptured slug removal in the C Reactor discharge area caused dose rates to personnel up to 5 r/hr. Dose rates of 500 rads/hr a few inches from the exhaust air duct flashing were encountered following slug burning on September 27.

Canning of rupture pieces at the 105-C Tech view pit occasioned dose rates to personnel up to 500 mrad/hr.

Personnel dose rates to 1 rad/hr were experienced on the 105-C charge face while swabbing a push pole.

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Installation and/or removal of lock bars on the B Reactor 3X ball hopper gates occasioned personnel dose rates to 400 mr/hr.

The 105-C 3X tunnel was inspected with dose rates to personnel of 3 r/hr.

C. Contamination Control

There were seven cases of skin contamination; all were readily decontaminated.

Of ninety vehicles surveyed, three were found to be contaminated up to a maximum activity of 6,000 c/m. They were all decontaminated.

Of the six cases of personal clothing contamination recorded, all except one have been released.

Reactor gas leaks on the front face of the C Reactor still present a radiological problem with dose rates up to 2 rads/hr encountered on the front face and 100 mrad/hr in the work area following reactor startups.

A total of 106 air samples were taken; none indicated activity densities greater than the permissible limits for respiratory protection worn.

D. Events Influencing Costs

A total of 198.2 overtime hours were worked for the operation this month.

B-C MAINTENANCE OPERATION

A. Equipment Experience

1. Instruments

Draw Down Test - On September 11, a draw down test on the "C" side clear wells was performed. Reported error was less than 0.5 percent.

2. Electrical

Pump Motors - 190-B Annex - Excessive brush wear damage to the negative slip rings required regrinding of these rings on five units.

Undervoltage Relays - 181-B - The undervoltage relays on the "B" side of the 181-B Building were installed.

3. Mechanical

HCR Seals - 105-B - During inspection of the sealing boots on Number 7 and 8 HCR, cracked carbon guide rings were discovered. The rings were replaced, molykoted, and placed back in service. After repair, leak testing indicated no gas leakage.

Tube Removal - 105-B - During the outage of September 2, 27 tubes were removed and replaced at a rate of 1.24 hours per tube and required 195 mr exposure per tube. Four air channels were retubed in addition to the regular tube removal.

B. Shift Maintenance Activities

Shift Maintenance activities included tube removal in both 100-B and 100-D Areas and rupture removals in 105-B and C. Other work in B-C Area performed by shift personnel was of the same nature as that assigned to all mechanical crews in B-C Area.

C. Maintenance Engineering and Planning and Scheduling

1. Instrument Engineering

Rear Face Thermocouples - The sticking condition as well as the general condition of the thermocouple wire insulation on the rear face was inspected jointly with the Material Development Operation. From inspection of a small number of wells, it is estimated that about one-third of the thermocouple wires are stuck in their wells. This condition, however, does not appear to affect accuracy or response of the thermocouple involved. Inspection of the thermocouple wire insulation outside the wells revealed that softening of the outer polyethylene insulation, due to heat, was quite evident in the central section of the rear face. The wire adhered to crossheaders and pig-tails where softening had occurred. The inner individual wire insulation appeared to be in good condition. Material Development Operation will issue a detailed report of this inspection.

Oxygen Analysis Equipment - The quotation from A. O. Beckman, Inc. for oxygen analysis equipment for B Reactor has been reviewed and discussed with the Purchasing Operation and the vendor. Several alterations were suggested to provide a more satisfactory system.

Assistance is being provided during installation and preliminary operation of the recently procured sampling system to be used in conjunction with the improved oxygen analysis equipment of C Reactor.

C Reactor Beckman Response Tests - Pile Physics Application Operation requested that response tests be made on a C Reactor Beckman micro-microammeter and controller. The tests indicated that for power excursions of several times the allowable rate of rise, the Beckman will give an almost instantaneous reading.

2. Mechanical Engineering

Design Change No. 168-C - Recent ball drops at two other areas were the results of a failed solder joint in a sensing line. Since both the Ball 3X and the No. 1 Safety Circuit sensing lines at C Reactor have similar soft solder joints, this design change was issued to replace them with lines and connections that will meet ASA Piping Code for this type service.

105-C Front Elevator Change - Engineering recommendations to reduce the existing load on the C Reactor Front elevator by approximately 8,000 pounds have been made to interested parties. This reduction of load is necessary to compensate for the expected load increase resulting from the addition of the pressurized charging machine (OCD).

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Reactor Piping Vibrations - Necessary repairs to the B Reactor rear crossheader supports to return them to the original design condition have been recommended. In addition, Facilities Engineering has requisitioned vibration instruments for further studies of B Reactor piping and equipment vibration.

C Reactor Effluent System - As various components of the C Reactor effluent system became accessible during the recent construction work, a number of inspections were made to determine the system structural condition. The results of these inspections together with recommended repairs have been issued to interested parties.

Ball 3X Recovery System - B Reactor - Due to malfunctions and inadequacies of the original equipment, the recovery of balls following a ball drop requires considerable reactor outage time, manpower and radiation exposure. A study to establish the deficiencies together with recommended modifications is being prepared.

3. Electrical Engineering

Design Change No. 142-C - Removal of Unused Components from Ball 3X System - 105-C Building - The purpose of this design change is to remove unused components from the system and to make circuit revisions and component replacements to increase the reliability of the system. Engineering is 90 percent complete and preparation of written instructions is about 40 percent complete.

Under Voltage Relaying - 181 Building - Engineering assistance was provided during the revision of a portion of the 181-B switch gear to provide more reliable undervoltage protection for the pump motors.

4. Planning and Scheduling

Productive Maintenance

During September, 5,594 man-hours of work was scheduled. This included 3,336 man-hours scheduled for September and 2,258 man-hours carried over from previous months. The overall total included 124 Class A, 272 Class B, 14 Class C, and nine lubrications.

Of the overall total, 3,113 man-hours or 55.6 percent was completed.

D. Events Influencing Costs

Overtime Usage - Total maintenance overtime required for the B-C Reactor Operation was 134 exempt and 358.9 nonexempt man-hours.

A. R. Maguire

Manager
B-C REACTOR OPERATION

AR Maguire:GSS:mus

D-DR REACTOR OPERATION
SEPTEMBER 1957

I. ORGANIZATION AND FUNCTIONS

There were no changes in the assigned responsibilities during September.

II. PERSONNEL

A. Force Summary

	<u>August 31</u>			<u>September 30</u>			<u>Net</u>
	<u>NE</u>	<u>E</u>	<u>Total</u>	<u>NE</u>	<u>E</u>	<u>Total</u>	<u>Change</u>
General	3	4	7	3	4	7	
D Processing	36	8	44	36	8	44	
DR Processing	30	7	37	32	8	40	+3
Power	112	14	126	112	14	126	
Radiation Monitoring	21	5	26	21	5	26	
Maintenance	<u>147</u>	<u>23</u>	<u>170</u>	<u>147</u>	<u>23</u>	<u>170</u>	
Total	349	61	410	351	62	413	+3

B. Movement of People

H. A. Michel, Supervisor Radiation Monitoring II (Days) transferred to Supervisor 100 Operations II (Extra Coverage) at DR Processing Operation.

G. Herman transferred from Supervisor Radiation Monitoring II (Shift) at H Reactor Operation to Supervisor Radiation Monitoring II (Days) at D-DR Radiation Monitoring Operation replacing Mr. Michel.

Nonexempt personnel movement during September included 6 transfers in, 1 reactivation, 2 transfers out and 3 terminations.

III. PERSONNEL ACTIVITIES

R. D. Miller and W. L. Smalley attended a meeting in 100-H Area initiated by D. K. Warner for the purpose of discussing the IPD Measurements Program.

DR Processing "C" Shift personnel visited the 300 Area on September 25, 1957, and were given a conducted tour of the 303 area where a number of the operators had previously worked.

A meeting of the IPD Maintenance Managers and the Manager of the Health and Safety Operation was initiated by R. R. Meyers for discussion of Maintenance safety rules.

L. F. Hannan, O. L. Olson, and seven Radiation Monitors are attending the Radiation Monitor training school for one-half day while on day shift.

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IV. SAFETY AND SECURITY

IPD Disabling Injury No. 2 occurred on September 3, at Building 105-D, when
investigation of the accident is covered in "IPD Disabling Injury 57-2." The
Corrective actions taken to prevent recurrence are:

1. Replacement of plastic guards with metal.
2. Signs attached to each machine, detailed operating instructions.
3. Safety catches installed to prevent accidental opening of the air valve.
4. Formation of an inspection team to inspect the machines during operation, recommend and act to improve the machines.

Eighteen medical treatment injuries were reported during September.

No security violations were incurred.

V. NON-ROUTINE REPORTS

The 100-D Area Annual Landlord Report for Fiscal Year 1957 was issued during September.

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

The ninth injury-free year for 100-D Area was completed during the month. To commemorate this achievement a series of four safety programs, including refreshments, were held on September 3rd to include all people working in the area on that day.

Salary Administration approval was obtained and position guides issued necessary to establishing the position of Specialist, Reactor Outages in the D-DR Maintenance Operation.

A meeting was held during the month with representatives from all Level IV components, and Maintenance Engineering, to discuss preparation of the Level IV Monthly Record Reports.

Recommendations were submitted to F. J. McKinnon regarding a proposal to reduce lost time on exit and entrance to the area by the bus passengers at shift change.

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B. Personnel Development

One Rotational Technical Graduate was added during the month. At month end there were four Technical Graduates on rotational assignments with the D-DR Reactor Operation.

Fourteen exempt people attended IPD Exempt Training Classes during September.

C. Cost Control Activities

A Maintenance Cost Meeting was held during the month and attended by E. W. O'Rorke and representatives from D-DR Maintenance, D-DR Plant Administration, and Financial Operation. Possible methods were discussed for more accurately measuring the costs of the D-DR Maintenance Operation. As an experiment in the further breakdown of Maintenance Costs it was decided to tabulate separately during the coming three months the costs of the Instrument Maintenance groups.

Coordination was provided in developing a revised manpower forecast for D-DR Reactor Operation covering the period FY-1958 and FY-1959.

D. Landlord Activities

The 100-D Area Annual Landlord Report for FY-1957 was completed and issued during September.

E. W. O'Rorke and W. L. Smalley attended a meeting held at 100-H Area during September for further discussion of 100-D Area and IPD office space problems.

Work orders were issued to the Construction Engineering Operation during the month to provide for blacktopping and graveling work to be done in 100-D Area.

D PROCESSING OPERATION

A. Production

Input production was 94.0 percent of official forecast. Maximum operating levels were limited by graphite and tube power limits.

Time Operated Efficiency was 72.3 which was 88.9 percent of official forecast. Two ruptures, a water leak and tube replacement, contributed to the large amount of outage time.

B. Operating Experience

1. Operating Continuity

<u>Outge. Date</u>	<u>Outge. Hours</u>	<u>Reason</u>
9-2-57	40.9	Rupture 1780-D, discharge of 30 T metal.

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1. Operating Continuity (cont'd)

<u>Outage Date</u>	<u>Outage Hours</u>	<u>Reason</u>
9-11-57	99.3	Rupture 1467-D, discharge of 53 T metal, 16 tube replacement, maintenance.
9-24-57	59.1	Water leak 0974-D, discharge of 13 T metal.

2. Equipment Experience

D Reactor was down a total of 199.3 hours due to Hunter-Douglas ruptures in tubes 1780-D and 1467-D, and a water leak in tube 0974-D. A total of 95.5 tons of metal was discharged during the three outages and 16 process tubes were replaced.

Electrical Maintenance began replacement of the VSR clutch plates and completed 9 of them during the month. A VSR seal equipped with thermocouples to measure seal temperatures following a scram was installed and the VSR seal air supply was equipped with a remotely-operated bleed-off to reduce the drag on VSR's during withdrawal after a scram.

Graphite stringer 1284-D was replaced.

A buzzer was attached to the "out" switch for HCR movement. By this means the operator is alerted whenever a rod is being withdrawn.

A 6" access hole to the rear face was drilled through the wall of X sample room to provide access to rear for long sections of piping and tools.

Two rows of 3X hoppers were equipped with new micro-switches.

All Hunter-Douglas material with tube factors greater than 1.0 and over a concentration of 150 units was discharged from D Reactor during September (101 tubes). 84 tubes still contain this type material.

C. Improvement Experience

1. Production and Process Tests

a. IP-12-AE -- "Poison Spline Flexible Control System, Suppl. D"

Ten additional spline caps were installed during the 9-2-57 outage. Following start-up, a total of 11 splines were inserted to provide partial reactivity control. Some difficulty was experienced in pushing the splines under the metal. Removal and disposal of the splines in the elevator pit tank was accomplished without difficulty. No seal failures have been experienced.

b. IP-81-92 FP - Irradiation of Fuel Elements Having Blunt-Nozed Truline End Contours

A total of 10 tubes of blunt-nose truline slugs were charged during the 9-11-57 outage. The pieces are too long to fit the present charging machine trays and required considerable time to charge. The trays are being modified as necessary to provide for further scheduled charging.

c. 105-575-SE - Special Irradiations Request ORNL I-183

Special Irradiation ORNL 183 and 184, Cobalt-90 samples, were discharged from 2984-D after having been irradiated for one year.

D. Events Influencing Costs

A total of 110.5 hours of non-exempt and 16 hours of exempt overtime was used during the month.

High essential materials costs can be expected in gas consumption and temporary poison. Additional use of new poison has been necessary because of the high attrition rate from ball valving. Gas losses this month averaged about 21,000 ft. per day.

DR PROCESSING OPERATION

A. Production

Input production was 107.4 percent of official forecast. Equilibrium power levels were limited by an arbitrary tube power limit to control ruptured slug frequency. Time operated efficiency was 82.0 percent which was 98.8 percent of official forecast.

B. Operating Experience

1. Operating Continuity

<u>Otge. Date</u>	<u>Otge. Hours</u>	<u>Reason</u>
9-5-57	34.8	Ruptured slug in tube 2879-DR.
9-11-57	91.4	Ruptured slug in tube 2477-DR.
9-15-57	3.6	Discharge of temporary poison.

2. Equipment Experience

The two ruptures which were experienced at DR Reactor during September were contained in Hunter-Douglas cans. The one in tube, 2879-DR, was removed at charge machine pressures. Considerable difficulty was encountered in removing the one from tube 2477-DR. Replacement of this tube was necessary and in the course of tube

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2. Equipment Experience (cont')

removal the rear wall of the discharge area became highly contaminated. Decontamination efforts to date have been only partially successful.

Additional leak tests of the 105-DR far downcomer were performed during the month but were unsuccessful in locating the leak(s) which are thought to be causing far side building settlement.

About 7.0 hours outage time has been used to date to correct leaking panellit toggle valves at DR Reactor.

Trouble with the Metal Loader inter-connection has caused several periods when the "C" elevator has been out of service. The circuit will be modified when the new motor is installed in the Metal Loader. This work is planned early in October.

The aluminum threads on the front ball valves of the poison column facility have become worn by contact with the steel collar that connects the charging machine to the ball valves. CG-558 funds will be used to install a threaded steel piece on the present ball valves to eliminate this problem.

Because of numerous ruptured slugs that have occurred in Hunter-Douglas cans, 155 tubes containing metal in these cans were discharged below normal goal exposure:

<u>No. of Tubes</u>	<u>Factor</u>	<u>Ave. Concentration</u>
77	≥ 1.1	200
5	≥ 1.0	150
73	≥ 1.0	210

There are 70 tubes with metal in Hunter-Douglas cans remaining in the reactor.

C. Improvement Experience

1. Production and Process Tests

PT-IP-0564 - "Evaluation of Low Hydrogen Dinged Uranium Fuel Elements"

Charged 6 tubes, discharged 8 tubes.

PT-105-529-SI - "Routine Exposure of Special Irradiation Samples"

Nine HAPO 184 samples were charged and discharged.

PT-IP-55-D - "Irradiation of Beryllium-Sodium Neutron Sources"

Charged and discharged one sample.

D. Events Influencing Costs

Overtime usage was 2.1 percent.

Unit cost is expected to be slightly below normal for this month.

D-DR POWER OPERATION

A. Operating Experience

Normal process water flow and pressure was maintained approximately 77.5 percent of the time to 105-D Reactor and approximately 82.1 percent of the time to 105-DR Reactor.

The Fire and Sanitary high tank was drained for inspection on September 11 and returned to normal service on the same day.

The semi-annual survey of the coal storage pile was completed on September 27.

The average evaporation rate for the month was 6.56 pounds of steam per pound of coal. The steam generating load was 76,517 pounds per house average, and 113,000 pounds per hour maximum.

The Fire and Sanitary water system was isolated on September 11, at the Fire and Sanitary high tank and 1707-D Building to make the 1717-D Building tie for Project CA-697. The system was returned to normal on the same day.

B. Equipment Experience

1. 183 Building

The Redler conveyor failed on September 5 when the sprocket wheels and drive chain in the vertical section broke. Repairs were completed on September 10.

Replacement of the cables on the filter differential controllers with non-twist cable was started on September 10.

2. 184 Building

Boedecker Chimney Construction Company of Tacoma, Washington, started repair work on No. 1 chimney on September 12.

Class "A" inspections on the No. 1 boiler and force draft fan were completed on September 13 and 20.

3. 190-DR Building

The primary impeller and wearing rings were replaced in the No. 8 pump unit with a new impeller and modified wearing rings on September 13.

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3. 190-DR Building (cont'd)

The primary impeller and wearing rings were placed in the No. 4 pump unit with a revised impeller and modified wearing rings on September 26.

D. Events Influencing Cost

Total overtime worked by 100-D and DR Power Operation employees during the month of September was 125.1 manhours for nonexempt.

Maintenance items that will increase September costs are:

1. Repairs on the 183-D Redler Conveyor system.
2. Winterizing program in each power building.
3. Class "A" inspection No. 1 boiler
4. Several class "A" inspections of equipment in the D and DR Buildings.

Water treatment cost has increased due to the increased feed of acid and alum at each Water Plant.

D-DR RADIATION MONITORING OPERATION

A. Radiation Occurrences

Seven lapse of radiation control were experienced during the month. Three occurred at D reactor and four at DR reactor, one of which involved skin contamination to a Supplemental Crews employee with responsibility charged to K Reactor Operation.

Five of these lapses of control were concerned with skin and/or protective clothing contamination. The maximum estimated dose from this contamination was 111 mrad, received by a D-DR Maintenance employee while removing the gunbarrel of tube #2477-DR. One involved the exposure of six men to above limits airborne contamination. This occurred on the charge elevator at the DR reactor while trying to discharge a rupture. Contamination was backflushed when the tube was opened after the quickie attempt.

Another was caused by inadequate timekeeping, which resulted in two DR Processing Operators receiving more exposure than planned. Estimated dosages were 257 and 232 mrad for the occurrence, however, their badges indicated no over-exposure.

The remaining lapse occurred when two D-DR Maintenance employees were exposed to radioactive gas as a result of opening a drain line, thought to be an oil line, in the #2 cooler-blower room of Building 115-D.

B. External Exposure Control

During the rupture removal activities with tube #2477-DR, gross contamination was spread in the discharge area. Dose rates of 500 rads/hr at 6" were detected on the rear wall; dose rates to a maximum of

B. External Exposure Control (cont'd)

10 rads/hr were received by personnel. A total of 9 people were exposed at rates equal to or greater than 3 r/hr. Decontamination efforts were partially effective and lead sheeting was hung at dose rates of 400 mr/hr to 3 r/hr. Subsequent charge-discharge operations were accomplished at dose rates of 200 mr/hr to 2 r/hr.

As a result of this #2477-DR rupture, the charge face and C-elevator became contaminated to 22.5 rads/hr. Decontamination efforts, at dose rates to 2 rads/hr, were not completely successful; this resulted in having to do normal charge-discharge work in dose rates to 100 mrad/hr.

Dose rates experienced during removal of poison control splines on several occasions at the D reactor were 200 mr/hr to 800 mrad/hr. A maximum of 1 r/hr was received when adjusting the shielding on the spline removal equipment.

The maximum dose rates associated with quickie attempts were 1,000 mr/hr to 2,500 mrad/hr.

C. Contamination Experience

Of 18 cases of skin contamination, 11 were associated with the rupture in tube #2477-DR. The maximum level of skin contamination was 20,000 c/m. All cases, except one, were decontaminated to releasable levels. This one exception concerned a Supplemental Crews Operator working at the D reactor who was sent home with hand contamination of 500 c/m. Further decontamination at the time was not advisable due to a partially healed injury and when the employee returned to work after a long shift-change, the contamination was < 100 c/m.

Six cases of personal clothing contamination were reported of which two resulted in confiscation.

The valve pit at the D reactor was established as a temporary radiation zone when effluent vapor was released from the discharge area near the relief riser through a steam siphon line. Maximum effluent activity was 50 mrad/hr. The condition was corrected during the next outage.

High background radioactivity, to 10,000 c/m, persists in and about the D reactor from various effluent vapor leaks.

D. Events Influencing Costs

There was no significant cost change during this month.

D-DR MAINTENANCE OPERATION

A. Equipment Experience

1. Instruments

At Building 105-DR the panellit toggle valve plunger sticking problem is becoming progressively worse. At present approximately

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1. Instruments (cont'd)

five man-hours are required to restore the valve plungers to normal after each full board base check or trip check.

An improved chamber has been installed on the backing voltage system of the No. 2 Flux monitor at Building 105-DR. This chamber is expected to produce readings of greater sensitivity and stability than those of the previous type chambers.

2. Electrical

Reinforced sheave wheels were installed in place of the original ones on the D-elevator at Building 105-D during September. (Failure of the original-type wheels had been experienced at Building 105-E)

The old unused inlet gate house at Building 107-D was removed during the month. New electrical leads were installed to the inlet radiation monitoring instruments.

3. Mechanical

The original compressor associated with the Building 105-D control room air conditioning system has become so badly worn as to require replacement. A new 10 ton Trane compressor is on order for this purpose.

Modification of the barometric condensers at Buildings 190-D and 190-DR to eliminate vulnerable freezing points was started during September.

B. Shift Maintenance Activities

The Maintenance Shift Crews worked in 100-D Area on controlled scheduled work during 93 percent of their working time during the month.

C. Maintenance Engineering and Planning and Scheduling

1. Instrument Engineering

a. Galvanometer System Test Device

A design has been completed for a device to be installed on the D-Reactor galvanometer system which will enable the operator to test the electrical continuity and operability of the system previous to reactor startup.

b. Air Bypass Valves for 190 Steam Pump Control

Sketches have been completed for installation of a three-way air valve on the Building 190-D and 190-DR steam pump control. This will permit bypassing of the emergency master air to the pump controls and prevent pressure excursions caused by the inadvertent tripping of the emergency master air solenoid valves during shutdown.

c. Thermocouple Wire for G-Stringers

Two types of thermocouple wire insulation (one ceramic and the other fiberglass) have been installed on a graphite stringer in D-Reactor for testing.

2. Electrical Engineering

a. Emergency Generator Study

Investigation was made into the reason for apparent failure of the Power House emergency generator to develop rated power. It was found that the wattometer was incorrectly connected and therefore reading low. The generator power output is as rated.

3. Mechanical Engineering

a. Restroom Addition to 100-D Area Main Badge House

Sketches have been completed for layout of a restroom addition to the main badge house.

b. Safety Latch for Charging Machine Air Valve

A safety latch has been designed which will prevent inadvertent operation of the charging machine air valve.

c. Design for Overhead Mounted Charging Machine

A Thor safety balancer was modified for use as a carriage and tested satisfactorily. Material for three additional machines was ordered on September 24, 1957.

4. Planning and Scheduling

A detailed procedure for the planning and scheduling of mechanical maintenance work in the D-DR Maintenance Operation was prepared and distributed to all Maintenance Supervisors and all 100-D Area Maintenance customers. Productive Maintenance is now being scheduled as planned and in most instances completed as scheduled.

D. Events Influencing Costs

The high exposure background presently existing in the Building 105-DR discharge area has increased the number of people required to perform the work required in that location. Overtime costs were increased in September due to this condition.

The oil house back of the maintenance shop is being converted to a materials storage room. Material received for specific work orders will be held under lock and key until all of the material is on hand

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D. Events Influencing Costs (cont'd)

for a specific job. The material expeditor will notify the Planning and Scheduling office that the work order material is complete and they in turn will schedule the work order at their earliest convenience. Use of this system is expected to eliminate misuse of materials and promote efficiency of operation.

E W O'Rourke

Manager,
D & DR REACTOR OPERATION

EW O'ROURKE:WLS:bc

F REACTOR OPERATION
SEPTEMBER - 1957

I. ORGANIZATION AND FUNCTIONS

No change.

II. PERSONNEL

A. Force Report

	<u>August 31</u>			<u>September 30</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	0	1	1	1	2	+1
Plant Administration	3	1	4	3	1	4	0
Processing	8	35	43	8	34	42	-1
Power	8	64	72	8	64	72	0
Radiation Monitoring	4	11	15	4	11	15	0
Maintenance	<u>15</u>	<u>87</u>	<u>102</u>	<u>15</u>	<u>86</u>	<u>101</u>	<u>-1</u>
Total	39	198	237	39	197	236	-1

B. Movement of People

E. H. Randa, Maintenance Supervisor I, transferred to 100-K Maintenance effective September 1.

J. G. C. Diehl, Facilities Engineering Operation, was transferred to F Maintenance Operation as Maintenance Engineer II effective September 1.

III. PERSONNEL ACTIVITIES

Eighteen F Reactor Operation employees participated in preretirement interviews during the month.

Two rotational Technical Graduates were transferred out of and one into F Reactor Operation during September, making a total of one Technical Graduate presently assigned to F Reactor Operation.

Twelve F Reactor Operation personnel attended information meetings on Effective Communications, conducted by E. T. Murphy.

Two Conference Table Meetings were conducted by C. N. Gross with seven exempt and ten nonexempt personnel attending.

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IV. SAFETY AND SECURITY

Five medical treatment injuries were reported during September. There were no security violations and no disabling injuries reported.

A safety slogan contest was sponsored to emphasize the start of a second year of operation by F Reactor Operation without a disabling injury.

V. NONROUTINE REPORTS ISSUED

Annual Landlord Report - FY-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 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

F PLANT ADMINISTRATION OPERATION

A. Administration Activities

Personnel rosters of F Reactor personnel were revised and issued.

Advices were reviewed. Comments for consideration in future revisions were submitted to the issuer.

Graphic aids have been prepared for internal use for future salary reviews.

A review of existing performance charts has been completed and revisions are being prepared.

B. Personnel Development

Three information meetings on "Effective Communications" conducted by E. T. Murphy were scheduled for F Reactor Operation with 21 exempt personnel attending.

One Technical Graduate is presently assigned to F Reactor Operation on a rotational training basis.

C. Cost Control Activities

A review of the cost analysis methods and reports to Level IV Managers was completed.

Simplified breakdowns of the Financial cost reports were prepared for the Level IV Operations to present cost data compatible with the forecasts prepared by the operations.

Procedures were initiated to integrate cost information relating to plant maintenance and to study manpower distribution by codes for F Maintenance Operation.

Visual aids used in the costs meetings were revised to present a more complete cost picture.

D. Landlord Activities

A study of charges made to the landlord account for building heating and lighting was made. This data will be used to establish a basis for Power Operation charges to reflect changes in accounting procedures for liquidation of Power Operation steam generation cost.

Work orders were issued to Construction Engineering for installation of asphalt concrete to meet area requirements.

F PROCESSING OPERATION

A. Production

F Reactor production was 108.1 percent of forecast during September. Time Operated Efficiency was 80.0 percent. Previous maximums in level and daily input production were increased 45 units during the month due to an increase in tube power limits to a nominal 950 KW. Production was above forecast due to high level efficiency and improved flattening.

B. Operating Experience

1. Operating Continuity

<u>Outage Date</u>	<u>Outage Hours</u>	<u>Reason</u>
9-8-57	91.0	Panellit scram. Cause unknown. Reactor remained down for scheduled charge-discharge, tube removal and project work.
9-12-57	0.6	Panellit scram due to gage fluctuation.
9-12-57	20.3	Removal of rupture from tube 0775-F.
9-19-57	30.4	Removal of rupture from tube 4058-F.
9-20-57	1.6	Manual scram to investigate high tube temperature indication.
Total	143.9	

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2. Equipment Experience

Tube Replacement - During the month, eleven process tubes were removed, ten of which were replaced, including two containing stuck ruptures, and seven with indicated severe external corrosion based on probolog results. In addition, two other externally corroded tubes were blanked for later replacement.

Ruptures - Two ruptured slugs were experienced during the month. Both were stuck and necessitated removal of tubes using forces up to 5000 pounds. Rupture data:

	<u>0775-F</u>	<u>4058-F</u>
Charge Date	8-8-57	6-11-57
Rupture Date	9-12-57	9-19-57
Lot Number	Z-397 (Hunter Douglas)	K-596 (Reg. HM - High Carbon)
Tube Power	807	608
Exposure	137	319
Factor	1.223	0.900

Following the rupture in 0775-F, 71 rupture-prone Hunter-Douglas charges with tube factors above 0.800 were discharged, leaving 15 low factor H-D charges in the reactor.

VSR'S

- The knuckled tip section of VSR No. 27 was shortened 13 inches due to excessive binding caused by graphite distortion. Operation has been normal following the revision.
- VSR No. 29 was removed from service when it failed to enter the last eight inches of travel. Investigation is planned during a future outage.

Gas Loss - Six severe rear face boot leaks were repaired after extensive leak testing during the September 19 outage. Gas loss was reduced approximately 1500 cubic feet per day.

C. Improvement Experience

1. Production Tests

Production Test IP-98-I - "Revised Tube Charge Pattern for Graphite Annealing" - Charging with revised loadings continued during the month and is now 65 percent complete. Initial traverse and flux data are favorable but inconclusive.

Development Test 105-561-A - "Testing of Neutron Sensitive Process Tube Ion Chambers" - The test assembly was removed from tube 0354-F and the tube returned to normal production. The initial test was unsuccessful.

2. Projects

CG-583 - "Moisture Monitoring System for the Detection of Leaking Process Tubes" - This project was closed out and accepted although the equipment will require modification. Engineering studies and revisions are in progress.

CG-558 - "Reactor Plant Modification for Increased Production" - Two major revisions were successfully completed during the outage of September 8.

- a. A new, molded Hypalon downcomer seal was installed. The new seal plus clearing the insulation space drain has eliminated the downcomer leakage problem.
- b. The 24-inch discharge line from the 1608 sump pumps to the new effluent line was revised to eliminate vapor locks in the system.

3. Other Improvements

PCCF - An additional eight ball valves were installed for a total of 24. Resultant net production gain during the month on start-ups and improved flattening was approximately 650 units.

Rear Drain Riser - The drain riser outlet was revised to correct the problem of washing out mattress plates. This problem had caused 13 hours of outage time during the previous month. No further trouble has been experienced.

D. Events Influencing Costs

Unit cost is expected to be approximately as forecast for the month.

POWER OPERATION ACTIVITIES

A. Operating Experience

1. Six process pump operation in 190 Building Annex was instituted on September 12 following a scheduled reactor shutdown. The change from seven to six pump operation was in accordance with the program for electrical load control.
2. Failure of differential relay for No. 1 transformer at 151-F Building on September 12 resulted in critical power condition grade "Y" from 1:45 a.m. to 5:31 a.m. It was necessary to replace the faulty relay with a spare unit from 200-E Area.
3. Electrical power disturbance on BPA system on September 17 at 9:30 p.m. caused opening of fence lighting OCB No. E6X38 in 184 Building. The 440-volt motor-generator set in 184 Building was lost from service immediately. No other equipment was affected.

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4. No detectable amount of "Turco", a cleaning agent used at 100-H Area and discharged into effluent on September 26, was noted at 181-F Building forebay. Regional Monitoring personnel conducted the survey.
5. Normal operating process water flow conditions were maintained 82.7 percent of the time during the month.

B. Equipment Experience

1. Inspection and photographing of pump impellers for No. 2 and No. 3 process pumps in 183 Building was completed on September 3 and 4, respectively. Work was sponsored by Project Engineering Operation for DeLaval Turbine Company.
2. The operating time interval for the No. 26 relays in synchronous motor control circuits in 190-A Building was tested on September 10. The time settings were found to be within specifications.
3. Inspection, testing and adjustment of electrical controls and motors for process pump discharge valves in 190-A Building was completed on September 10. A short circuit was detected and corrected in wiring for No. 6 pump by-pass valve control.
4. Defects in No. 1 and No. 5 resistance temperature detectors for No. 4 process pump motor in 190-A Building were found to be open circuits in elements imbedded in motor stator windings. Wiring connections to these elements were removed on September 19. Repairs to this equipment will be made at time of motor winding wedge inspection in the near future.

C. Improvement Experience

1. Projects

CG-558 - "Reactor Plant Modification for Increased Production"

- a. No. 15 pump at 181 Building was out of service from September 4 to September 17 for shaft realignment by Construction forces.
- b. The temporary six-inch steel pipe installed by Construction forces in Fire and Sanitary water line south of 182 Building was replaced with cast iron pipe on September 9. The original cast iron pipe was damaged during construction activities by Construction forces.
- c. A three-way lock-type air valve was installed in air control line to process water pump steam turbines in 190 Building on September 11. This device will permit control of process pump turbine acceleration during shutdown periods.
- d. The Sharples portable oil purifier was delivered to the 190-A Building on September 13. Installation of piping for oil purifier was started on September 27.

- e. Approximately 75 percent of the exception list items on Project CG-558 have been completed to date.

CG-650 - "Replacement, Repair and/or Removal of Valve Houses" -
The replacement of valve houses has been completed except for two minor exceptions.

CG-714 - "Replacement of Steam Line Support Poles - Phase II" -
Replacement of poles and valve platforms scheduled for this phase of Project has been completed and accepted with minor exceptions.

2. Other Improvements

The installation of a Republic master pressure regulator in air control circuit for 190 Building process pump steam turbine controls was completed on September 26. This equipment will permit accurate control of steam turbine driven process pumps during periods of extensive valving operations in 105 Building during shutdowns.

D. Events Influencing Costs

Chemical costs have continued above normal due to the higher consumption because of film control required in the reactor.

Maintenance costs have been increased because of installation of a master regulator for steam turbine process pump control in 190 Building and because of the preventive maintenance work required in 190-A Building on motor slip rings and brushes.

RADIATION MONITORING OPERATION

A. Radiation Occurrences

Two lapses of control were incurred in F Operations area. One was charged to IPD general as a result of the presence of reactor gas activity on the Charge Elevator and the work area. The second was charged to F Reactor Operation (Maintenance) when two riggers received personal contamination during mattress plate replacement.

No radiation incidents were incurred.

B. External Dose Rates

Dose rates to personnel above 3 r/hr to a maximum of 5 r/hr were incurred in three instances during ruptured fuel element removal operations.

Radiation activity of recovered poison fuel elements resulted in dose rates to personnel up to 1700 mrad/hr including 400 mr/hr experienced during removal of the elements from the storage basin and 200 mr/hr during sorting operations.

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C. Contamination Experience

Overflow of the 1608 crib spread contamination up to 10,000 c/m within the controlled area. No significant contamination was detected outside the established radiation zone.

One case of vehicular contamination to 6000 c/m was encountered and attributed to newly hatched Caddis Flies and other insects trapped in a Security Patrol car radiator. This contamination is an ultimate result of reactor effluent discharge to the Columbia River.

The activity of the 183-F Filter beds rose from 6000 c/m to 25,000 c/m in the period immediately following discharge to the river of the 105-H Reactor rear face decontamination solution.

Nominal short-lived activity of 800 c/m was detected on the ground throughout the area and attributed to the off-site testing of atomic weapons.

D. Events Influencing Costs

No unusual items to report.

F MAINTENANCE OPERATION

A. Equipment Experience

1. Electrical

New terminal blocks were installed in the trail cable junction box located on the "D" elevator, permanent wire markers provided, the near side slack chain limit switch reactivated and lower limit switches removed.

A buzzer alarm denoting withdrawal of any horizontal rod was installed as recommended by Research and Engineering.

No. 26 relay in each of the 190 Annex motor field control panels were checked and adjusted. All motor slip rings and brushes were inspected and modified guards were installed on motors Nos. 1, 3, 5, 6 and 7 to permit inspection of the slip rings.

The Class "A" overhauls of the coal handling system were completed. Likewise, the winding and controls for the low-boy heaters were completed.

The Class "A" overhauls involving the Flocculator motors at the 183 Building were completed this month. Other work at the 183 Building included relocating an acid motor "stop" button control on the third floor, and replacing conduit and wiring for the pump room instrument power panel.

2. Instrument

During September 920 Panellit gages were given an inboard inspection for possible bourdon tube leaks. A total of 13 gages were removed as suspected leakers.

In conjunction with the September Heise gage check of the No. 2 Panellit panel, a reverse flow measurement of all related sensing lines was completed. The majority of the lines show a flow of 1200 ccpm with some flows as low as 650 ccpm.

Eighteen faulty rear face thermocouples were repaired during the month by cutting off the tip and making a new couple on the same leadwire.

All Gamma Monitor sample room turrets have now been modified by Special Maintenance forces. The changes made were: (1) the holes in the turrets which house the photomultiplier heads have been made larger to prevent wear of the water cooled jacketed heads, and (2) the water cooled heads are supported on adjustable nylon screws which permit centering of the probes within the turret. The problem prior to these modifications was that leaks developed in the water cooled probe jackets due to the lack of clearance between the probes and turret.

3. Mechanical

The mechanical activities involved three major outages consisting of one scheduled and two rupture outages in addition to two short duration "scram" outages.

A trial run of the Millwright and Pipefitter proposal covering reactor work was conducted during the September 8 outage.

All of the reactor building 12-inch valve pit strainers were cleaned. During this work, three of the four-inch drain valves on the strainers were found to be leaking and were blanked off.

All of the sheaves on the "C" elevator have been replaced with sturdier sheaves.

The repiping of the supply fans in 105 and 115 was continued and is now approximately 80 percent complete.

All mechanical overhauls of the flocculators at the 183 Building have been completed.

The inspections and overhauls of the guillotine valves at the 183 Building is approximately 90 percent while the filter control board valve overhauls are 70 percent complete.

The overhauls of each boiler at the 184 Building have been completed. Insulation work remains to be done on the No. 2, 3 and 4 boilers.

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HW-52809

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B. Shift Maintenance Activities

The major activities of the shift mechanical personnel were devoted to the various reactor outages and related tube programs at F and H Areas.

C. Maintenance Planning, Scheduling and Engineering

1. Electrical Engineering

The major activities were devoted to the preparation of prints and instructions for the revision of the "D" elevator junction box wiring and the establishment of a procedure for recording brush wear data on the 190 Annex synchronous motors.

2. Instrument Engineering

The important activities consisted of following and directing the fabrication of thermocouple stringers, investigating the relocation of the 105 bulk outlet temperature thermohms and the investigation of the details for the oxygen analyzer installation.

3. Mechanical Engineering

Activities in this field consisted of an evaluation of the Ball 3X vacuum system problems and compiling data for the status of the area pressure vessel survey.

4. Planning and Scheduling

Concentrated effort is being expended to provide the necessary equipment and tools at the 105-F Reactor for process tube replacement. Approximately 10 percent of the equipment and tools requested for fabrication from the Central Maintenance shops have been received. The balance is expected in 15 to 60 days. Approximately 60 percent of the equipment and tools assigned to F Area Maintenance for fabrication have been completed. The balance will be completed during October. The air tool equipment, ordered through Central Maintenance is scheduled for delivery in October.

a. Property Control - The disposal of excess materials and equipment, primarily from the 185 Building storage was continued during this period.

b. Productive Maintenance - Approximately 31 percent of the available manpower was assigned to Productive Maintenance work during this period.

C. N. Gross, Manager
F REACTOR OPERATION

CNG:EWW:mc

H REACTOR OPERATIONSeptember, 1957I. ORGANIZATION AND FUNCTIONS

No change.

II. PERSONNELA. Force Summary

	August 31			September 30			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
Plant Adm. Oper.	3	1	4	3	1	4	0
Processing Oper.	10	36	46	10	35	45	-1
Power Operation	11	65	76	11	66	77	1
Radiation Monitoring Oper.	5	12	17	5	12	17	0
Maintenance Oper.	14	79	93	14	78	92	-1
Central Maint. Oper.	18	71	89	17	73	90	1
	<u>62</u>	<u>265</u>	<u>327</u>	<u>61</u>	<u>266</u>	<u>327</u>	<u>0</u>

B. Movement of People

G. Herman, Supervisor, Radiation Monitoring, transferred from H Reactor Operation to D/DR Reactor Operation.

C. L. Owen transferred to H Radiation Monitoring Operation from Facilities Engineering Operation as Supervisor, Radiation Monitoring.

There were six transfers into H Reactor Operation, five transfers out, and one reduction of force.

III. PERSONNEL ACTIVITIES

W. J. Ferguson and G. T. Freed attended a sheet metal forum in Seattle, Washington, presented by the Star Machinery Company and the Cincinnati Shaper Company, September 9, 1957.

Thirteen exempt H Reactor Operation employees attended Personnel Training Program Classes.

IV. SAFETY AND SECURITY

There were no disabling injuries, serious accidents, or security violations during the month.

Eighteen medical treatment injuries were reported.

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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 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 Activities**

A survey was conducted to determine which professional or trade society meetings, training courses and seminars H Reactor Operation personnel should attend. Results of the survey were forwarded to the Financial Operation for consideration in the total IPD program.

B. Personnel Development

Arranged schedule for attendance of H Reactor Operation exempt personnel at fourth quarter training courses.

C. Cost Control Activities

Established a procedure whereby daily maintenance labor charges are broken out by individual job and reported the following day to the Operation authorizing the work.

Made arrangements for the Financial Operation to report overtime, used by each Reactor Operation, on a monthly basis for the first two months of the quarter and on a weekly basis for the third month.

Made arrangements for the Financial Operation to liquidate the Central Maintenance Operation Engineering costs for tube replacement to the Operations receiving the service. This liquidation will reduce Central Maintenance IME which in turn will reduce Central Maintenance charges to Operations which are not in the tube replacement Program, but use Central Maintenance services.

D. Landlord Activities

Issued work authorization to replace condensate piping in 1761-H Building, construct a parking lot by the 190-H Building, and repair wind damage to the side of the 184-H Building and 1704-H Building roof.

H Processing Operation

A. Production

Input production was 92.3 per cent of the forecast. Less than forecast production resulted from a month-end flurry of stuck ruptures. The ruptured slugs were caused by a moderate overpowering of near-center tubes during a cold startup.

The record maximum power level was increased 25 units as a result of improved flattening.

Equilibrium power levels were governed by a tube power limit of 850 KW.

B. Operating Experience

1. Operating Continuity

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

<u>Day</u>	<u>Hours</u>	<u>Reason</u>
3	0.4	Reactor scrammed by an unexplained power loss to No. 3 process pump.
4	0.3	Reactor scrammed by a timer failure during a test run of No. 3 process pump.
11	0.3	Reactor scrammed by improper valving during a measurement of Panellit pressure.
21	85.8	Reactor scrammed when a rear pigtail became disconnected from its nozzle. The outage was continued on a scheduled basis for charge-discharge and tube replacement.
25	3.8	Reactor scrammed by a low Panellit trip on tube 1959-H. A piece of welding rod was found in the venturi throat.
27	0.3	Reactor scrammed by a low Panellit trip on tube 2074-H. It appears that upstream plugging by an undetermined kind foreign material was the cause.
27	24.6	Shut reactor down for a stuck ruptured slug in tube 1858-H.
29	47.1	Reactor scrammed from a low Panellit trip on tube 1665-H. A stuck ruptured slug had blown a hole in the tube. Three other stuck ruptures had been detected in the near-center tube area at month end. A 24 per cent overpowering of this region during a cold startup has been established as the cause of the ruptures.

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HW-52809

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2. Equipment Experience

Ruptured Slugs - Five stuck ruptured slugs were experienced during the last four days of the month. The only explanation for the first one is the effect which several scrams would have on a slightly inferior slug. The other four ruptures are definitely attributable to a 24 per cent overpowering of near-center tubes during a minimum time cold startup. The effect was worsened by the concentration of the excessive flux in the upstream portion of the tubes. Thirty tons of metal were discharged (on October 1) at approximately 50 per cent goal to remove incipient ruptured slugs from the high power region.

C. Improvement Experience

1. Charge-Discharge

The limited capacity of the drain risers at the older reactors has prevented flow reduction for charge-discharge on all crossheaders at the same time. By taking advantage of a steam jet for reducing drain riser pressures, by improving the venting of the drain risers, and by performing charge-discharge at the conclusion of the tube replacement when fission heating has moderated, it has been possible at H Reactor to set up the complete discharge without any danger of stopping flow to the tubes. This improvement, along with the use of motorized cap wrenches, has contributed to new charging records 35 per cent better than previous performance.

2. Flushing Hose

A single high pressure water line is used during outages for flushing metal out of a tube prior to replacement and during operation for operating the poison column charging machine. The installation of a trail hose on the C elevator has resulted in these operations being performed more safely and 50 per cent faster.

3. Decontamination of Rear Face Piping

In collaboration with Radiation Monitoring personnel, inside and outside surfaces of rear piping associated with tubes in the top half of H Reactor were decontaminated with a solution of Turco 4306-B. The radiation level reduction was conservatively measured at a factor of three. It is believed the increased efficiency of maintenance work performed under lower radiation and contamination levels will more than pay for outage time used for this cleaning, and all reduced manpower costs will be profit.

D. Events Influencing Costs

Material Handling - A new fork lift was placed in service this month for unloading metal trucks and other heavy duty jobs. Direct labor savings will be \$300 - \$400 a month.

Overtime amounted to 60 hours this month. About half of it was used to provide shift change coverage.

H Power Operation

A. Operating Experience

Process water flow to the reactor was reduced five times during the month for a total of 149 hours. This represents a time operated efficiency of 79 per cent.

The normal steam generating rate was 39 M lbs/hr, with an average of 38.4 M lbs/hr. An evaporation rate of 6.33 pounds of steam per pound of coal was attained.

Two reactor scrams were caused by malfunctioning electrical equipment. On September 3, at 2:05 p.m., No. 3 pump motor relayed out and failed to restart. On September 4, at 9:57 a.m. the scram circuit was activated during a routine test of No. 3 motor breaker in Building 151. In both instances power services were restored within the scram recovery time. Comprehensive tests by Project Engineering and H Maintenance Operation failed to reveal any causes for the two incidents.

The 300 hp high tank pump motor burned out on September 23. This failure was attributed to wiping of the inboard motor bearing, thereby allowing the rotor to rub against the stator. Plans for motor replacement or repairs are in progress. However, two or three months will be required to complete the job. Water for this facility is being pumped with emergency steam equipment.

Alum feed rates were increased approximately 30 per cent above normal in order to control reactor tube filming.

B. Equipment Experience

Divers from McCray Marine Company, Seattle, completed an underwater inspection of the pump suction well and forebay on September 23. The inspection indicated minor amount of soft silt in the pump suction wells, with maximum buildup in extreme ends at the steam pumps. The forebay apron was clean for a distance of approximately 65 feet from the building structure. No removal is planned at this time since adequate channels are available at each end of the sand bar.

An inspection of the 183-H Building No. 1 process pump by Project Engineering Operation on September 5, showed the impeller to be in good condition. The unit will be re-inspected after an additional thousand hour running period.

Representatives from Facilities Engineering and H Power Operations ran a series of load severance tests on the 184-H Building turbo-generator on September 24. The generator speed increased approximately 150 rpm when a 750 KW load was instantaneously dumped. These tests were in conjunction with a study of HAPO electrical generating facilities.

An inspection of No. 3 190-H Building annex pump impeller was completed on September 27. The first stage element was cavitated through approximately half of the vanes. Plastic molds were made of the wear sections for future

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HW-52809

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comparison checks, and new design wear rings of smaller internal diameter were installed. Further changes of wear rings in other units will be delayed because of priority work in the White Bluffs shops.

C. Improvement Experience

Project CG-558 - Correction of exception list items continues. As of month end, this work was estimated to be 85 per cent complete.

H Radiation Monitoring Operation

A. Radiation Incidents

There were no radiation incidents involving actual overexposure to personnel.

One Lapse of Radiation Control occurred when a Maintenance Operation employee was allowed to receive an estimated exposure of 358 mrem for a seven-day period. Investigation of the man's personnel meters showed 65 mr for this period, establishing that no overexposure occurred.

B. External Exposure Control

A series of five ruptures which occurred late in the month presented serious radiation control problems. Dose rates on the pigtail of tube 1858-H and the cap of 1665-H were about 500 rads/hr. Personnel dose rates as high as 5 r/hr were encountered during installation of "Quickie" equipment. After failure of the "Quickie" attempts, removal of the stuck charges was accomplished with maximum dose rates to personnel of 500 mr/hr or less for work on the Discharge Face.

Dose rates up to 2300 mrad/hr at surface including 800 mr/hr at 2 inches have been found on pallets of reclaimed poison. However, sorting and cleaning this material involved personnel dose rates of 200 mr/hr or less. Improved radiation control of this material has resulted from storing it in the Metal Storage Room rather than outside the Wash Pad.

Sixty-two vehicles were surveyed with only one being found contaminated to a detectable degree.

No cases of skin or personal clothing contamination were recorded during the month.

A recent windstorm blew contaminated material out of the Minor Construction burial trench. The maximum contamination level involved was 6,000 c/m. The area involved was cleaned up and released a few hours later.

Some contamination spread resulted from removal of tube replacement equipment through the lead door from the Discharge Area. Floor contamination to 6,000 c/m resulted, and paper covering the floor was contaminated up to 2 rads/hr at surface in a temporary roped off zone in the Storage Area.

D. Radiation Training

The Radiation Monitor Training School was started on schedule and is progressing satisfactorily. Fifty-two Monitors and Journeymen are attending, 19 of whom are from the Radiation Protection Operation of Hanford Laboratories Operation. The balance are all IPD personnel.

A new Radiation Protection Topic, No. 5, was issued. The title is "Personnel Contamination."

E. Events Influencing Costs

A total of 74 hours of overtime were required during the month to provide monitoring service for tube replacement work and for rupture removal.

H Maintenance Operation

A. Equipment Experience

1. Instruments

Pressure Monitor - An inboard inspection was made on four rows of the Panellit system (17, 18, 19, and 20). The inspection revealed seven leaking gages which could have resulted in a scram had they not been replaced. Approximately 24 manhours of labor were expended to release and replace stuck Hoke toggle valve stems.

No. 2 Galvanometer - Installed a relay in the No. 2 galvanometer power supply so that in case of power failure the galvanometer will automatically switch over to battery power supply.

2. Electrical

Resistors - Ball 3X Hopper Coils - A burned out dropping resistor was isolated on No. 42 hopper which caused a high resistance reading. This resistor was replaced and a requisition has been issued to acquire enough resistors to make replacement at all hoppers.

4500 HP Motor - 190-H Annex - Frequent checks of the brushes on the slip rings are being made. These brushes tend to wipe onto the slip rings until a high resistance is built up, causing arcing. One set of brushes is being checked on the No. 7 unit.

B. Shift Maintenance

Shift Maintenance personnel spent 90 per cent of their time in 100-H Area. The remainder was utilized in assistance to 100-F and 100-K Areas.

C. Planning, Scheduling and Engineering

1. Instrument Engineering

Pressure Monitor System Toggle Valves - A request has been forwarded by Purchasing and Stores Operation, to Hoke, Inc., for a quotation and

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HW-52809 DEL

delivery date for 12,935 replacement spool assemblies.

2. Electrical Engineering

4500 HP Motors - 190-H Building - Recent unexplainable malfunctions of the 4500 hp motor controls have prompted intensive test and investigation in an effort to determine the possible causes of difficulties. Changes made include lowering the trip setting for the power loss relays. The result of this change is, in effect, a de-sensitizing of these relays, particularly to insignificant transient power conditions.

3. Mechanical

Rupture Removal - Five ruptures were removed from the reactor during the outages of September 28 and 29. Forces up to 14,000 lbs were used to remove one of the ruptures. After the ruptures were removed, the tubes were replaced.

4. Planning and Scheduling

Property Management - During September efforts were renewed to locate 14 missing property items. Since at least four independent efforts have been made to locate these items without success, it is reasonable to conclude that these items no longer exist at 100-H Area. Steps will be taken to secure relief from the assigned responsibility.

D. Events Influencing Costs

Overtime required in H Area was 426 hours.

Central Maintenance Operation

A. Machine Shop

The work backlog increased from 30 to 35 crew days. This is the result of the I & E Program for 105-KE Reactor in addition to the normal flow of work orders. Three-hundred K Reactor nozzles were delivered to the shop for a .030-inch increase of internal diameter. These nozzles will be used for interchange of those presently in service, while the latter will be reworked at the regulated shop. Other major items on which shop time was expended, includes fabrication of 500 front face nozzle inserts, fabrication of thermocouple stringers and connectors, and fabrication of special reactor tooling.

The Toledo Scales Company representative performed the first quarterly inspection of the contract year during the week of September 9. Minor repairs and adjustments were made. No major difficulties or recommendations were reported.

B. Regulated Shop

The work load in this shop increased during the month. Major items of accomplishment included servicing 140 splitters, 80 used broaches and 25 new broaches, refacing 225 nozzle inserts, and conversion of 73 front face nozzles, excessed by the Project CG-558 Program, to rear face service.

C. Paint Shop

Painting forces have concentrated for the past month in 100-B, C, H, and K Areas. This spread was necessary to close the exterior paint program. Interior painting will start on approximately October 7, 1957. Planned work was slowed due to a large outflow of work from the metal fabrication shop needing paint, 120 manhours required on Projects CG-512 and CG-657, and reconditioning of the 105-C Building fresh air receiver. The salvaging of this tank by sandblasting and refinishing the interior, represents a saving of approximately \$1400.

D. Central Maintenance Engineering

1. Tube Replacement Tooling

In an effort to reduce the time delays that have occurred in the minimum tube outages (10 to 50 tubes), a new method of tube replacement has been proposed by Central Maintenance Engineering. In this method, one tube is stripped, split, removed, replaced, and connected to the water system before moving the elevator to reposition for the next tube.

A test trial of this method was made at H Reactor on September 21 on three tubes. The rate of tube removal was reduced from one hour-49 minutes, to 53 minutes with no specialized training other than step-by-step explanations of which tools to use and when.

Tools and equipment are being readied for training in White Bluffs so that all 100-H Area Maintenance supervisors and men can be thoroughly trained on the single-tube method. The single-tube method will be employed during the H Reactor October 21, outage.

2. Shop Methods and Tooling

A new 13-inch Monarch tool room lathe has been received and is to be installed during the month of October. Also received, was a Kearney and Treacker Milling machine that was found to be very misrepresented on a government excess list. The machine was found to be some 22 years older than the surplus list had indicated, and its general condition proved unsatisfactory for Central Shop use. The machine will be returned for disposal through Surplus Sales.

3. Field Engineering

Engineering services have been provided to set up a boring fixture for the conversion of 2000 DR Reactor nozzles for use on the I & E slug program.

Manager
H Reactor Operation
IRRADIATION PROCESSING DEPARTMENT

RTJessen:HCS:met

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KE-KW REACTOR OPERATION
SEPTEMBER, 1957

I. ORGANIZATION AND FUNCTIONS

There were no changes of assigned responsibilities during the month.

II. PERSONNEL

A. Force Summary

	<u>August 31</u>			<u>September 30</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</u> <u>Total</u>
General	1	1	2	1	1	2	0
Plant Admin. Oper.	4	1	5	4	1	5	0
KE Processing Oper.	10	35	45	10	35	45	0
KW Processing Oper.	9	35	44	9	36	45	+1
Power Oper.	13	74	87	13	74	87	0
Rad. Mon. Oper.	6	19	25	6	19	25	0
Maintenance Oper.	21	132	153	22	131	153	0
Supp. Crews Oper.	<u>10</u>	<u>65</u>	<u>75</u>	<u>10</u>	<u>63</u>	<u>73</u>	<u>-2</u>
	74	362	436	75	360	435	-1

B. Movement of People

E. H. Randa, Supervisor, Maintenance, F Maintenance Operation, was transferred to Supervisor, Maintenance, KE-KW Maintenance Operation, effective September 1, 1957.

E. B. Ives, Supervisor, Maintenance Relief, KE-KW Maintenance Operation, retired effective September 1, 1957.

J. E. Phillips was transferred from CPD to KE-KW Maintenance Operation as Supervisor, Maintenance, KE Electrical Operation, effective September 9, 1957.

P. E. Lindstrom, Supervisor, Maintenance, KE Electrical Operation, assumed the duties of a Maintenance Electrical Engineer, KE-KW Maintenance Operation, effective September 23, 1957.

Changes during the month included ten transfers in, eight transfers out, two terminations and one retirement.

III. PERSONNEL ACTIVITIES

G. W. Wells, Power Engineer, attended a meeting with M. H. Schack and N. F. Fifer of IPD Process Design Operation, and J. T. Rayner of the Bingham Pump Company, relative to proposed low-lift pump modifications for increased flow.

R. J. Bursey visited the Shell Oil Company refinery in Anacortes, Washington, on September 13 for the purpose of observing the centralized stenographic services. A trip report has been issued.

J. P. Jones, representing the Travelers Insurance Company, made a third-party inspection of a boiler in each of the 165 Buildings. Arrangements for the visit were made by E. W. Baker of IPD Standards Engineering Operation.

IV. SAFETY AND SECURITY

No major injuries or security violations were incurred during the month.

Eighteen medical treatment injuries were incurred.

The K Plant Safety Council began its program of safety meeting judging. The program is designed to improve the quality of Plant safety meetings. The "A" Shift members of the Safety Council were replaced by representatives from "B" Shift. All K Plant operational components were represented on the Council, including components of R&U, HLO and R&E.

V. NON-ROUTINE REPORTS

"Trip Report - Visit to the Shell Oil Company" - R. J. Bursey.

"I & E Loading and Operational Problems at K Reactors" (Secret Rough Draft), A. P. Vinther to R. S. Bell, 9-25-57.

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. Administrative Activities

Personnel changes in the Rescue Crews were made to conform with recent transfers of personnel between shifts and Reactor Operations.

Arrangements were made to procure silver wire for Maintenance Operation's graphite stringer work. The Precious Metal Inventory records were reconciled with R. W. Ramon of the Financial Operation for the quarter ending on 9-30-57.

The KE-KW Reactor Operation's estimated requirements for permanent placement of Technical Graduates for FY 1958 and 1959 were submitted.

B. Personnel Development

Eighteen exempt personnel attended an information meeting conducted by R. T. Jaske on the IPD relationships with the BPA system.

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HW-52809

Attendance to IPD Training Courses was as follows:

Financial Operation Orientation:	RL Olsen, MW Marquard, HS Davis
Data Processing, Commercial Session:	LB Brown, JW Jones
Data Processing, Engineering Session:	WR Moon
Understanding People:	JHM Miller, RM Nelson, RL Olsen GE Greger, AN Stinson

An information meeting and a visit to 105-KE was held for 13 K Plant secretarial personnel. J. R. Fishbaugher, KE Processing Supervisor, was principal speaker.

R. J. Bursey attended an information meeting conducted by W. F. Engesser, on the Industrial Engineering studies of charge-discharge operations and of paperwork reduction.

V. R. Griffith, Training Specialist, made training contacts with three exempt and 95 non-exempt members of IPD Power and Maintenance Operations. Electrical training was extended to include the Maintenance Operation electricians in all reactor areas.

There were three Technical Graduates assigned in the Operation at month end.

C. Cost Control Activities

A report of progress made to date on major items in the cost reduction program was made to P. D. Lee, Chairman of the IPD Cost Reduction Task Force. In the interests of creating a unified effort in the cost reduction program, copies of the report were distributed to all KE-KW Reactor Operation supervision.

D. Landlord Activities

The Landlord Annual Report was compiled and submitted to the Financial Operation.

An engineering study was initiated to investigate means of improving the air balance-flow of the 1704 Building heating-cooling system.

A letter was issued to all K Plant supervision outlining their responsibilities in the upkeep of the facilities they occupy. A questionnaire was attached to solicit ideas on improved janitor service and cost reduction of building maintenance.

KE PROCESSING OPERATION

A. Production

Input production was 94.2 percent of the forecast. Equilibrium power levels were limited by the reduced rupture control tube power limit established on September 1. This limit was raised by 50 units on September 20 and retained at that level for the remainder of the month.

B. Operating Experience

1. Operating Continuity

Reactor outages totaled 107.8 hours for the month. Operating continuity was affected by the following events:

<u>Day</u>	<u>Hours</u>	<u>Remarks</u>
1	6.2	Continuation of outage of 8-31 caused by fuel element failures in 4150 and 5460. Metal processing and maintenance was accomplished.
4	27.3	Manual shutdown to maintain reactor temperatures within limits following a heat cycle. Metal processing and maintenance was accomplished.
19	40.5	Scheduled outage for metal processing.
26	33.8	Panellit scram on row 29. Exact cause of the Panellit failure was not determined. Metal processing and necessary maintenance was accomplished.

2. Equipment Experience

- a. Vertical Safety Rod System - VSR Number 23 was moved to VSR channel 66, which was empty. This change was in preparation for the installation of the reamed step plug and new nitrided rod in channel 23. Three leaking VSR gas seals were replaced.
- b. Horizontal Control Rod System - Number 16 HCR was removed from the reactor and the old HCR Number 18 was installed in its place. This move was made in preparation for installing half-rod Number 16 in channel 3 for added control flexibility. Number 19 HCR continued to bind. Plans were made to borescope the channel on the next scheduled outage.
- c. Instruments and Circuitry - A seismoscope relay failure on September 27 resulted from a relay coil failure on the SXB safety circuit. The coil was replaced and all circuits were returned to normal. Electrical line transients affected the LIPP instrumentation, causing spurious trips during operation. Much of the difficulty was traced to the new gamma monitor system and was corrected.

There were two resistance temperature detector failures on the temperature monitor system and one spurious temperature monitor trip. Cause of the trip was not determined.

The reason for the Panellit scram on September 26 was not determined. Vertical jumpers were installed on vertical rows 52 through 72 of the Panellit panel Number 2, placing the coordinate indicator system in operation in that section of the board. Five Panellit line nozzle fittings were replaced to correct slow responses. Oil was added to the sensing lines of Panellit gages in zones 2, 3, 4 and 5, to reduce the wide range of oscillation in an effort to improve Panellit reliability.

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HW-52809 **DEL**

- d. Process Water System - The expansion joint on the far end of rear crossheader 42 failed during the outage of September 19. A new expansion joint was installed. On September 26 the expansion joint on the far end of rear crossheader 14 was found to have a small leak. Plans were made to replace the joint during the next outage. The expansion joints that were removed last month were inspected by T. D. Dow of the Material Development Operation. The cracked sections were cut out and decontaminated to facilitate further examination.

C. Improvement Experience

1. Production and Process Tests

- a. PT-IP-74-A - Irradiation of Stainless Steel Jacketed Four Rod Cluster Fuel Elements in the 1706-KER Recirculation Test Facility, Loop K-3, Tube 3565-KE - Twenty fuel elements were charged in accordance with the subject production test on September 19.
- b. PT-105-550-E - Inpile Facilities of 1706-KE - One 1706-KE tube was processed with material for this production test on September 26.

2. Others

All tubes in orifice Zone 5 and 78 tubes in orifice Zone 4 were re-orificed in accordance with Design Change 165, "Re-Orificing of K Reactors".

Manifolds were installed on the front face risers A, C and D in preparation for completion of Design Change 173, "Dual Sensing Lines for Header Pressure Switches".

KW PROCESSING OPERATION

A. Production

Input production was 97.1 percent of forecast. The maximum level attained during September was 250 units below the high achieved in July. Four unscheduled outages were experienced.

B. Operating Experience

1. Operating Continuity

Reactor outages totaled 124.0 hours for the month. Operating continuity was affected by the following events:

<u>Day</u>	<u>Hours</u>	<u>Remarks</u>
6	38.2	Hunter-Douglas fuel element failure. Metal processing and maintenance was accomplished.
16	29.1	Beckman scram. Metal processing and maintenance was accomplished.

Day HoursRemarks

- 22 27.8 Panellit gage trip. Metal processing and maintenance was accomplished.
- 28 28.9 Trip from Number 1 Beckman intertie with KE Reactor. Metal processing and maintenance was accomplished.

2. Equipment Experience

- a. Ruptures - The reactor was shut down on September 6 to discharge a slug column from tube 2476. The column of Lot A-136 had Hunter-Douglas cans. Based upon rupture experience at D and DR Reactors with these cans, Process Technology recommended the discharge of all such tube loadings having a tube factor of 1.0 or greater and a concentration of 150 MWD/ton or greater. A total of 243 columns was discharged during the outage. The remaining fifty tubes were discharged during the September 16 outage.
- b. Instruments and Circuitry - Sixteen plugged sensing lines were found and cleaned during the Panellit line flow checks. No plugged lines were experienced during operation. Three Panellit scrams occurred that were caused by oscillating gages in the fringe orifice zones. Two of the scrams occurred prior to actual startup on September 29.

The fringe orifice replacement program was continued. All of the fifth zone orifices (100) were changed to fourth zone orifices and 172 fourth zone and ten third zone tubes had new secondary orifices installed.

Five temperature monitor trips were experienced this month, three of these being spurious and unexplained. Eleven inoperative thermobulb circuits were corrected by either replacing the thermobulb and adapter or installing new leads.

The reactor was scrambled when Number 4 Beckman trip was being reset on September 16. A check of all Beckmans failed to find cause of the scram. The reactor was scrambled by the KE Reactor Beckman intertie on September 28. Two high trips were experienced at KE Reactor during startup, causing the reactor scram. Recovery was not possible under the recently revised "hot" startup procedure in effect at the K Reactors.

- c. Gas Usage - High gas usage was experienced this month and KW Reactor is expected to continue this high usage rate until the rear face tube bellows are repaired or replaced. The daily average helium usage was 14,485 cubic feet compared with August's 12,305 and July's 7,980 cubic feet. The gas automatic makeup system will not function properly under the present gas usage rates and manual control is required to maintain proper reactor pressure.

C. Improvement Experience1. Production and Process Tests

- a. PT-IP-25-A - Graphite Burnout Monitoring Program - The graphite samples from channel 1880-KW were removed during the September 16 outage and a new group of samples was charged.

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HW-52809 D

2. Projects

- a. CG-669 - Water and Gas Leak Locating Equipment - 105 Buildings -
All the work has been completed with the exception of minor alterations. Testing of the equipment is scheduled for October.

KE-KW POWER OPERATION

A. Operating Experience

Power facilities operated satisfactorily during the month. No equipment failures or operational malfunctions contributed to a reactor outage or delayed a reactor startup during the month.

1. Electrical Peak Control Efforts

Eight reactors were in operation simultaneously on nine different occasions. During the 74 hours of peak operation, the interruptible power required was about 785,000 kwh. The HAPD electrical demand totalizer located in the 165-KW Control Room has been either totally out of service or unreliable during the period September 27 to month end, due to moisture leakage into the telephone cables. Location of the trouble spot has not been determined. This situation has compounded the problem of controlling the electrical peak so as not to exceed the firm control demand.

B. Equipment Experience

1. Speed Control Failure - Number 4 High Lift Unit - 165-KE

The Number 4 liquid rheostat controls failed to respond at 3:35 p.m. on September 20 when in the process of raising water pressure for a routine reactor startup. The required flow was maintained with the remaining five units until 5:50 p.m., when the faulty relay action in the electrode control circuit was cleared by Maintenance forces.

2. Electrolyte Concentration Increase - 190-KE Liquid Rheostats

The electrolyte solution concentration was increased on all liquid rheostat units in 190-KE from 0.8 percent sodium carbonate in solution to 1.2 percent on September 5 to yield a greater electrode spacing when at maximum speed. The change was made following similar solution concentration increases accomplished in the 190-KW units during July.

3. Third Party Inspection of Fired Pressure Vessels

A third party inspection of the Number 2 boiler in 165-KE and the Number 3 boiler in 165-KW was conducted by a representative of the Travelers Insurance Company on September 25.

C. Improvement Experience

1. Projects

- a. CG-663 - Steam Driven Auxiliaries - The first of the combustion air control modifications necessitated by the conversion to a

single forced draft fan speed was completed during the month on the Number 1 boiler in 165-KW. The boiler was placed in service on September 19. Subsequent operation has indicated that the single forced draft fan speed and control modifications will yield a significant improvement in maintaining accurate combustion control at all boiler loads.

- b. CG-743 - Ventilation Improvements - 165 and 1-0-KE and KW Buildings - Bid invitations were issued September 12 with the bid opening date set for October 8 on the improvement project.

KE-KW RADIATION MONITORING OPERATION

A. Radiation Occurrences

Nine Radiation Occurrences were reported by the Monitoring personnel, one of which was classified as a Lapse of Radiation Control. This Lapse involved the spread of contamination to the 105-KE Building and the ground area between the Building and the rod storage cave when the Organic Recirculation Loop (ORA II) was removed from the reactor. Detailed information of this Occurrence is reported under "Contamination Experience". The Radiation Occurrence was formally investigated and recorded in Document HW-52817. Four Radiation Occurrences were reported by 1706-KER Monitoring personnel, one of which was recorded as a Lapse of Radiation Control.

B. External Exposure Control

Charge-discharge operations were conducted at normal dose rate of 60 to 30 mr/hr to personnel.

A horizontal control rod was successfully removed from KE Reactor and replaced during unit operation. The maximum personnel dose rate while removing and replacing the rod was 200 mrem/hr. A dose rate of 4 r/hr was required for personnel to wrap the old rod to prevent contamination spread.

The average dose rate during removal of the (ORA II) Loop from the X-1 level of KE Reactor was 100 mr/hr. The loop was replaced at a maximum dose rate of 600 mrad/hr.

Dose rates on the KER Recirculation Loops have increased steadily during the present operating period. The average dose rate in Cell 4 has increased to 30 mr/hr, Cell 3 to 10 mr/hr and Cell 2 to 25 mr/hr. The maximum personnel dose rate was 1 r/hr to change the strainer for Loop 2. The maximum dose rate on the Loop equipment in 105-KE is 14 rad/hr, including 140 mr/hr on the front face nozzle connector of Loop 2, due to a small water leak. Plans were made to repair the leak during the next outage.

C. Contamination Control

Contamination up to 40,000 c/m was spread within 105-KE during removal of the inpile portion of the Organic Recirculation facility. The ground area between the 105 Building and the rod storage cave was contaminated to 1.5

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HW-52809

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rads/hr at surface. There were about 25 cases of shoe contamination, and two of skin contamination cases. All but one pair of shoes were successfully decontaminated. The affected areas were decontaminated and released.

D. Events Influencing Costs

There were 59 manhours of overtime worked in 100-K Area as compared with 247 manhours worked in August. The variance can be attributed to the improved operating experience.

KE-KW MAINTENANCE OPERATION

A. Equipment Experience

1. Instruments

- a. Panelits - Corrections were made on 33 mercury separations. Adjustments were made to approximately 2,453 gages, 87 percent of these being changes completed during outages. Five hundred and twenty-five new type gages were installed. New gages installed now total 631 in 105-KW and 1,294 in 105-KE.
- b. Temperature Monitoring System - Ten resistance elements and eight connectors were replaced in the 105 Buildings.
- c. Power Calculator - A sudden full-scale reading prompted an investigation which revealed mercury loss in a flow transmitter in 165-KE. Repairs and corrections were made to the packing gland.
- d. Gas System - An Orsat Analyzer was fabricated and installed to better analyze pile gas in 105-KE. This equipment is expected to improve accuracy and reduce maintenance costs.

2. Electrical

- a. Ball 3X System - 105-KE - Hopper probe covers were insulated to eliminate false indications when the probes move out of adjustment.
- b. Emergency Generators - 190-KE - Plans were made to replace the over-current relays protecting the 5000 KVA generators as a result of a letter from the vendor indicating that the resistors in the present relays may be inadequate.

3. Mechanical

- a. Crossheaders - Repacking has been completed on the near side cross-header valves in 105-KW.
- b. Process Tube Assemblies - 105-KW - Tube 3065 was removed for Process Engineering examination. The channel was shielded and blanked off.
- c. 1706-KE and KER - The heat exchanger on Elmo Loop 1 was modified to effect better cooling. Design Changes were completed on ORA Loop 1.

The KER safety circuits were revised. The work included revisions of pump differential pressure circuits, boiling point suppression, tube exit temperature and pressure and the process water backup valve. This work was accomplished in accordance with Design Change Number 179 as released by the K Maintenance Engineering Operation.

B. Maintenance Engineering, and Planning and Scheduling

1. Instrument Engineering

- a. Temperature Monitoring System - Final approval was obtained on specifications for replacement of temperature monitor lead wire. The specifications were forwarded to AEC purchasing representative for use in soliciting vendor comments and bids. Design work was begun on a rear face duct to enclose the junction of the existing lead wires and the new replacement leads.

Approximately 50 resistance temperature detectors were removed and turned over to the Instrument Development Operation to study the effects of operating conditions on the effective life of the detectors.

2. Electrical Engineering

- a. Electrical System - An expanded scale recorder was installed in 165-KW to allow closer monitoring of the HAPD power demand.

Recommendations regarding a portable hydraulic list for removing circuit breakers in the 165 Buildings have been submitted to the Power Operation.

3. Mechanical Engineering

- a. 107-KE - The basin chute repair work was completed on "A" Basin.
- b. Monorake Drive Handling Facility - 181-KE-KW - The recommendations of IPD Serious Accident Number 57-15, covering scaffold revisions, a permanent beam with a trolley and the larger dolly to transport the drive mechanism to and from the work site, were fulfilled with exception of the larger dolly. This item is on order.

4. Planning and Scheduling

- a. Work Scheduling - All shift work, excepting priority emergencies, is now planned and scheduled with regard to equipment outage time, material procurement and job information.
- b. Productive Maintenance - Class "A" overhauls were completed on 111 items of equipment and Class "B" overhauls on 168 items.

D. Events Influencing Costs

1. Overtime Usage

A total of 340.3 hours of overtime was worked in K Area as compared to 569.7 last month.

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HW-52809

Hours worked in 1706-K Building	- K Personnel	61.5
Hours worked in KE-KW Reactor Operation	- K Personnel	155.3
	- Others	123.5
Total in K Area		340.3
100-K Personnel in Other Areas		304.5

Total hours worked by K personnel in all areas amounted to 521.3 hours and is approximately 66 percent of the forecast.

2. Spare Parts

Additional parts were placed in stock in the estimated value of \$1,269. A decrease of \$6,113 in estimated value of inventory stock was made. The major portion of this was a reduction of the inlet nozzle stock. Spare parts usage totaled \$11,083.

SUPPLEMENTAL CREWS OPERATION

A. Events Influencing Costs

1. Overtime Usage

There were 337.9 hours of non-exempt overtime worked by Supplemental Crews' personnel. No exempt overtime was worked. All overtime was chargeable 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>Percent</u>	<u>Area</u>	<u>Percent</u>
100-B	22	100-F	9
100-C	13	100-H	12
100-D	15	100-KE	9
100-DR	11	100-KW	9

R. S. Bell
Manager
KE-KW Reactor Operation

RSB:GEG:prb

PRODUCTION OPERATIONSEPTEMBER, 1957I. ORGANIZATION AND FUNCTIONS

No change.

II. PERSONNEL

<u>Force Summary</u>	<u>As of 9/30/57</u>			<u>8/31/57</u>	<u>Net Change</u>
	<u>Ex.</u>	<u>Non-Ex.</u>	<u>Total</u>	<u>Total</u>	
General	1	1	2	2	0
Prod'n Forecast'g & Sched'g	6	5	11	11	0
Computing & Machine Records	3	3	6	5	+1
Reports & Statistics	2	2	4	4	0
Essential Materials	1	1	2	2	0
Totals	13	12	25	24	+1

M. L. Gragg, Production Clerk, was transferred into Computing & Machine Records from the Relations & Utilities Operation on September 2.

III. PERSONNEL ACTIVITIES

W. S. Slippern attended the Customer Programming Training Course for the IBM Type 650 Calculator from September 23 through October 1. The seven four-hour sessions were presented by members of the Data Processing Operation, R & U Operation.

On September 30, five eight-hour training sessions were initiated within the Computing & Machine Records group to provide programming instructions for the Type 407 Accounting Machine scheduled to be installed in October.

E. Bailey visited the Gas Ice Corporation's carbon dioxide plant in Finley, Washington on September 30.

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

<u>Doc. No.</u>	<u>Title</u>	<u>Classif'n</u>	<u>Author</u>
None	IPD Electricity Loads and Control	None	J.R. Young

This informational document describes the current HAPO electricity situation as an aid for operating personnel during control of the electricity load. Included is a description of the electricity contract, current and future electrical loads, and load control measures.

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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. FUNCTIONAL ACTIVITIES**A. Production Forecasting, Scheduling, and Analysis****1. Production Forecasting**

Work was continued on preparation of the official forecast scheduled for issuance in late October.

2. Production Scheduling**a. Discharge Concentrations**

There was no change in the discharge concentration plan for regular material during September. A temporary ten percent reduction of the average discharge concentration occurred because of emergency discharge of 123.5 tons of metal at 55 percent of goal in order to avoid an excessive number of ruptures in known rupture-prone material. However, discharge concentrations during previous months have been high enough that the average concentration to date during this fiscal year remained above the desired goal. The table below summarizes the uranium discharges during September in order to avoid ruptures.

<u>Reactor</u>	<u>Tons Metal Discharged</u>	<u>Reason for Discharge</u>
C	7.6	Possible rupture zone
D	18.5	Hunter-Douglas cans
DR	13.3	" " "
F	9.1	" " "
KW	36.5	" " "
KE	33.2	" " "
KE	5.3	Rupture-prone lots

b. Enrichment

Calculation of E metal discharge goals based on the maximum specific power of each tube was completed during September. Under the current plan, goals range from 371 MWD/Ton for the tube with the highest specific power (69 kw/foot) to 1312 MWD/Ton for tubes operating at 30 kw/foot or less. The higher number represents an arbitrary upper limit of 1000 MWD/Ton for a fully charged tube.

During September seven tons of E metal were discharged and no ruptured slugs were encountered.

c. Electric Power

Planned usage of interruptible power occurred without scheduling difficulties during portions of nine days during September. No power interruptions occurred during the periods when interruptible power was in use.

d. Process Tube Replacements

There were four scheduled tube replacement outages in September, as shown below:

<u>Reactor</u>	<u>Tubes</u>
B	31
D	16
F	10
H	20
Total	<u>77</u>

e. Off-Plant Shipments

One cask of 12 uranium slugs for North American Aviation, Inc., and one cask of isotope material for ORNL were shipped during September.

2. Operations Analysis

a. Electricity Load Control

The formal procedure for control of IPD electricity usage was completed and issued this month. Copies of the procedure with appropriate cover letter were forwarded to other HAPO components to obtain interdepartmental cooperation and to assure plant-wide recognition of the present contract limitations on electrical loads. An unclassified informational document describing the current HAPO and IPD electricity situation was prepared and issued for use of IPD personnel during control of electricity loads.

b. External Tube Corrosion

Document HW-51980 describing the status of external corrosion on recently-installed 100-F Reactor process tubes and suggesting further tube examinations was issued. (See Section V above).

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

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HW-52809

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production data reports were issued to implement the scheduling, forecasting and 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. Special production data reports were prepared for Reactor Operations which experienced fuel element failures.

The first of five replacement IBM machines ordered in April, 1957, was installed on September 23, when a Type 82 Sorter was replaced by a Type 83 Sorter; the new machine operates at 1.67 times the speed of the Type 82. In addition, the new machine edits each IBM card for errors in punching. Errors detected and corrected during routine sorting operations can, in general, be handled in significantly less time than if they were to pass undetected into more advanced operations.

A method for implementing the variable goal exposures recommended for enriched natural uranium was developed, programmed, and put into use during September. (Reference: HW-51416, "Recommended Goal Exposure Plan for Cored and Solid E-Metal", RR Bloomstrand, 7-17-57).

C. Reports, Statistics & S. S. Accountability

1. Reports & Statistics

a. Daily Reporting

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 August was assembled and issued. Included were the production summary and six pages of statistics prepared by this office.

A Production Summary for August, with explanation for variance from forecast, was prepared for management.

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

c. Production Statistics

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

The central IPD Chart Room (Room 34, Bldg. 1704-H) received approximately 50 visitors this month during the controlled-access periods of 10:00 AM and 1:00 PM each Tuesday when the classified

charts were on display. By month-end a total of 44 wall charts had been completed, representing essentially all of the total contemplated. Some revisions were in progress to improve the usefulness of the data.

Other production statistics work performed during September included the following:

Production data, operating efficiencies, outage hours and tube replacement information were furnished the Product Cost and Budgets Operation.

Weekly reports showing process water flow and related reactor data were supplied to the Radiation Protection and Analytical Laboratories Operations, Hanford Laboratories Operation.

Information was supplied the Plant and Industrial Engineering Operation and the Component Testing Operation each morning showing which reactors were operating.

Power level, water flow and tube replacement data were given to the Process Engineering Operation, FPD.

Tube leak data for the post-completion report on Project CG-583 was developed for the Engineering Auxiliaries Operation.

Arrangements were made with the plants, Research & Engineering, and Employee Relations for the assembling of reactor safety information requested by the AEC-HOO for calendar 1957.

D. Essential Materials

Rail and truck shipments received in September were as follows:

Carload shipments for IP Dept.	438
Carload shipments for other Depts.	184
Truck shipments for IP Dept.	49
Total shipments received	<u>671</u>

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

1. A carload of filter sand from the Manufacturers Mineral Co., Chewelah, Washington, was received on September 23 and returned to the vendor because it did not meet the specified screen size.
2. The testing of a liquid CO₂ metering device was witnessed at the Gas-Ice Corporation's plant in Finley, Washington on September 30. If satisfactory, this meter would be used by

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HW-52809

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the vendor to measure liquid CO₂ from rail tank cars into the storage tanks at B, D and F Areas. However, the accuracy of the meter was not determined as it failed to work properly due to damage suffered in a previous test.

C. A. Priode
Manager
Production Operation

REACTOR OPERATIONS & STATISTICS - PROCESSING
September 1957

	B	C	D	DR	F	H	KE	KW	TOTAL
Input Prod.-Pu (% of Forecast)	97.3	96.9	94.0	107.4	108.1	92.3	94.2	97.1	97.8
Time Oper. Eff. (% Overall)	71.7	71.7	72.3	82.0	80.0	77.4	85.0	82.8	77.9
No. of Reactor Outages & Hrs.	No.	Hrs.	No.	Hrs.	No.	Hrs.	No.	Hrs.	No.
Scheduled	1	114.5			(1) 1	89.0	(1) 1	40.5	0
Unscheduled									
Scrums	7	2.8	1	2.2	2	4.2	5	6.3	3
Other	3	86.6	6	201.4	2	50.7	2	71.7	1
			3	199.3	2	129.8	1	33.5	3
Total	11	203.9	7	203.6	5	143.9	8	162.6	6
Break'd'n of Reactor Otge Hrs.									Total of Hrs.
Planned									
Charge-Discharge	54.9		55.1	83.0	28.4	37.6	71.3	61.4	422.1
Tube Replacement	69.3		30.5		5.8	34.7			140.3
Project Work					25.0			1.0	29.0
Production Test		(3) 61.7	4.8		1.5	8.7		1.3	78.0
Maintenance	25.2	8.0	27.5	3.9	26.6	3.8	15.0	26.6	136.6
Miscellaneous	4.0						4.2	2.7	10.9
Sub-Total	153.4	127.8	145.8	34.3	87.3	84.8	90.5	93.0	816.9
Unplanned									
Rupture Removal	34.3	(2) 65.5	12.3	95.5	39.5	71.7	(2) 3.2	7.3	329.3
Leak Testing	13.7		28.2						41.9
Maintenance		9.1	11.6		1.0	4.8		5.0	31.5
Instru. & Circuitry	2.5				4.2	0.6	8.8	18.7	34.8
Miscellaneous		1.2	1.4		1.3	0.7	5.3		9.9
Charge-discharge	-	-	-	-	10.6				10.6
Sub-Total	50.5	75.8	53.5	95.5	56.6	77.8	17.3	31.0	458.0
TOTAL	203.9	203.6	199.3	129.8	143.9	162.6	107.8	124.0	1274.9
No. Slug Rupt.- All Types	3	5	2	2	2	5	0	1	20
Tubes Installed-Repl. Progr.	31	0	16	0	10	20	0	0	77
Type of Water Leaks									
Tube	0	0	1	0	0	1	0	0	2
Van Stone	1	0	0	0	0	0	0	0	1

- Remarks:
- (1) Scheduled outage following Panellit trip.
 - (2) Includes 13.6 hrs at C and 3.2 hrs at KE for ruptures which occurred during August.
 - (3) Includes 45.4 hrs for the removal of a production test I & E rupture.

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REACTOR OPERATIONS STATISTICS - SLUG RUPTURES
SEPTEMBER, 1957

Type Material	Tube No.	Type Rupture	Remov. Hrs.	Charge Date	Rupture Date	Act. Conc.	Lot No.	Removal Method			Remarks
								Chg. Mach	Hyd. Jack	Tube & Piece	
8" Reg.	2386C	Not available	1.9	6-6-57	9-2-57	388	TK608	x			
8" Reg.	2472C	Split	31.0	6-6-57	9-2-57	384	TA114		x		
8" Reg.	1780D	Side Hot Spot	8.0	5-30-57	9-2-57	471	C-251		x		Hunter-Doug.
8" Reg.	2879DR	Side Hot Spot	13.7	6-18-57	9-5-57	386	Z-343		x		Hunter-Doug.
8" Reg.	1571C	Side Hot Spot	11.4	6-6-57	9-5-57	407	TK521		x		
8" Reg.	2476KW	Unclassified	7.3	7-28-57	9-6-57	212	AI36				Hunter-Doug.
8" Reg.	2477DR	Side Hot Spot	81.8	8-10-57	9-11-57	188	AI49			x	"
8" Reg.	1467D	Not available	4.3	7-28-57	9-11-57	229	AI36		x		"
8" Reg.	0775F	Not available	9.1	8-8-57	9-12-57	137	Z397			x	"
8" Reg.	0874B	Side Hot Spot	12.9	9-2-57	9-15-57	59	AI66		x		
8" Reg.	2780C	Side Hot Spot	7.6	6-6-57	9-16-57	453	Z312		x		
8" Reg.	2476B	Split	21.1	6-1-57	9-18-57	473	AI07				
8" Reg.	4058F	Not Available	30.4	6-11-57	9-19-57	319	K596				
I & E	1965C	Not available	45.4	3-4-57	9-26-57	2186				x	*PT-IP-1A
8" Reg.	1170B	Side other	**0	6-30-57	9-27-57	398	C857			x	
8" Reg.	1858H	Split	24.6	7-22-57	9-27-57	267	C270			x	
8" Reg.	1655H	Split		5-12-57	9-29-57	392	AI03		x		Leaker
8" Reg.	1168H	Split	47.1	7-9-57	9-29-57	352	AI34			x	
8" Reg.	1264H	Split		5-12-57	9-29-57	362	C242			x	
8" Reg.	2956H	Split		5-12-57	9-29-57	344	Z357		x		
*Evaluation of I & E Slugs Operating at High Specific Powers											
**Removed during charge-discharge.											

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REACTOR OPERATIONS STATISTICS - POWER

WATER FLOW DATA	100-B	100-C	100-D	100-DR	100-F	100-H	100-KE	100-KW	TOTAL
<u>RIVER WATER (BLDG. 181)</u>									
TO RESERVOIR GPM AVG	79,380		77,230		67,276	66,034			289,920
TO FILTER PLANT (C-DR-K) GPM AVG	76,500		57,400				150,500	151,800	436,200
TOTAL GPM AVG	155,880		134,630		67,276	66,034	150,500	151,800	726,120
TOTAL MM GALS	6734.0		5816.0		2906.3	2852.7	6501.6	6557.6	31,368.4
<u>RESERVOIR WATER (BLDG. 182)</u>									
TO FILTER PLANT GPM AVG	62,940		71,600		63,336	63,500			
TO COND SYSTEM GPM AVG	3,600		5,630		3,940	2,534			
TO EXPORT SYSTEM GPM AVG	12,840		0		0	0			
TO EXPORT SYSTEM GPM NOR	12,840		-		-	-			
TO EXPORT SYSTEM MM GALS	551.6		-		-	-			554.6
<u>FILTERED WATER (BLDG. 183)</u>									
TO POWER HOUSE GPM AVG	125		150		100	74	43	16	
TO PROCESS GPM AVG	57,000	69,800	59,400	61,200	61,076	60,500	145,100	143,200	
TO DR GPM AVG			4,320						
TO F & S SYSTEM GPM AVG	131		300		212	139		50	
<u>PROCESS WATER (BLDG. 190)</u>									
TO REACTOR GPM AVG	56,600	69,400	59,000	60,800	60,676	60,100	144,700	142,800	654,076
GPM NOR	71,200	86,500	71,200	70,100	71,661	70,000	163,500	164,300	768,461
TOTAL MM GALS	2445.1	2998.1	2548.8	2626.6	2621.2	2596.3	6251.0	6169.0	28,256.1
<u>RIVER DATA</u>									
ELEVATION (MSL FT.) (MAX)	389.0		381.3		367.7	373.1	-	383.8	
(MIN)	386.5		378.5		365.1	370.9	-	380.2	
(AVG)	387.7		379.0		366.2	372.0	-	382.0	
TEMPERATURE AVG °F	64.0		66.0		67.3	66.7	-	64.6	

SHEET 2

REACTOR OPERATIONS STATISTICS - POWER SEPTEMBER, 1957

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	2719.0	3304.8	3093.1	2479.7	2736.1	2743.2	6501.6	6557.8	30135.3
CHEMICAL CONSUMPTION										
	CHLORINE (BLDG. 182)	0		0		1900	0			1900
	LBS (BLDG. 183)	16,399	23,362	24,000	17,000	22,615	25,065	61,100	51,500	241,041
	AVG PPM	0.7	0.8	0.9	0.8	1.0	1.1	1.1	0.9	1.0
LIME	LBS	0	0	0	0	0	0			0
	AVG PPM	-	-	-	-	-	-			-
ALUM	LBS	109,672	116,979	189,000	118,000	174,727	114,605	303,500	309,500	1,435,983
	AVG PPM	4.8	4.2	7.4	5.7	7.7	5.0	5.6	5.7	5.7
SEPARAN	LBS	0	0	0	0	0	0	0	0	0
	AVG PPM	-	-	-	-	-	-	-	-	-
SULPHURIC ACID (AS 100%)	LBS	217,873	255,766	256,000	169,000	208,747	224,672	507,900	567,500	2,407,458
	AVG PPM	9.6	9.3	9.9	8.2	9.2	9.8	9.4	10.4	9.6
DICHROMATE	LBS	43,000	51,300	41,700	39,500	40,802	37,910	94,500	92,200	440,912
PURGE MATERIAL CONSUMPTION										
SOLIDS	LBS	0	500	0	0	0	1000	450	801	2751

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REACTOR OPERATIONS STATISTICS - POWER SEPTEMBER, 1957

SHEET 3

ANALYTICAL DATA									
RAW WATER									
PH	PH AVG								
		8.10	8.00	8.16	8.24	8.36	8.32	8.03	8.02
		6.0	5.0	1.0	3.0	4.0	4.0	4.0	4.0
		7.00	6.90	7.03	7.00	7.00	7.01	7.02	7.02
		.003	.004	.003	.003	.003	.003	.004	.004
		.05	.05	.12	.09	.05	.17	.06	.06
		1.80	1.80	1.90	1.80	1.85	1.90	1.80	1.80
				</					

REACTOR OPERATIONS STATISTICS - RADIATION MONITORING

September 1957

	B	C	D	DR	F	H	KE	KW	IPD Total
Special Work Permits Issued	38	24	16	22	7	88	13	9	217
Routine and Special Surveys	490	574	589	422	437	342	364	131	3349
Air Samples Taken	54	52	59	52	28	40	37	50	372
Hand Contamination Cases	1	0	1	0	3	0	3	0	8
Skin Contamination Cases	4	3	5	13	2	0	1	1	29
Contaminated Injuries	0	0	0	0	0	0	0	0	0
Vehicles Contaminated	2	1	0	0	1	1	0	0	5
No. of Cases of Personal Clothing Contamination	0	6	2	6	1	0	25	C	40
No. of Cases Contamination Spread Outside of Radiation Zones	7	11	4	4	1	0	1	1	29
No. of Employees for whom Dose Rates ≥ 6 Rads/hr. Were Established	0	5	0	9	3	1	1	1	20
Lapses of Control (Reactor Operation)	4	1	3	4	*2	1	**2	0	17
No. of Hours Training Others	9	7	10	8	2	203	0	0	239
Attendance at Mtgs for Training Others	31	46	53	40	0	81	0	0	251

REACTOR EFFLUENT DATA	B	C	D	DR	F	H	KE	KW
No. of Effluent Calculations	90	90	108	108	175	125	78	81
Ave. Beta Dose Rate (mads/hr.)	14.7	13.6	5.3	7.9	10.8	14.5	8.8	13.4
Ave. Gamma Dose Rate (mads/hr.)	24.3	22.1	12.7	18.3	19.0	23.2	17.7	33.0
Ave. Total Dose Rate (mads/hr.)	57.0	42.0	18.0	26.2	29.8	37.9	26.5	46.4
Ave. Total Dose Rate (mads/hr.)								
Ave. Integrated Dose in 24 hrs.	936.0	855.0	424.0	629.0	715.2	819.1	636.0	1114.0
Max. Integrated Dose in 24 Hrs in 19	1835.0	4300.0	2780.0	3202.0	1664.8	1840.8	4383.0	4598.0

* One (1) for IPD General

** One (1) for KER

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FACILITIES ENGINEERING OPERATION
MONTHLY RECORD REPORT

SEPTEMBER, 1957

I. ORGANIZATION AND PERSONNEL

Responsibility

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

Personnel Statistics

	<u>August 31, 1957</u>	<u>September 30, 1957</u>	<u>Net Change</u>
Employees on Payroll	280	277	-3
Technical Graduate - (Rotational)	12	15	+3
Technician Trainees	4	2	-2
Summer Employees	6	0	-6

Following are changes since the last report:

	<u>FEO</u>	<u>Tech.Grad. (Rot.)</u>	<u>Tech. Trainees</u>	<u>Summer Employees</u>
Transfers Into Operation	5	4	1	0
Transfers Out Of Operation	4	0	2	0
Payroll Removals	4	1	1	6

General

EQUIPMENT DEVELOPMENT

M. D. Kelley, Engineering Assistant, was granted LOA to return to school, effective September 20, 1957.
M. F. Gillis, Summer Employee, resigned September 20, 1957.
A. R. Stubberud, Summer Employee, resigned September 6, 1957.
K. L. Bergman, Summer Employee, resigned September 12, 1957.
K. J. Wright, Technician Trainee, transferred in on September 30, 1957.
U. R. Call, Technical Graduate - Rotational, transferred in on September 23, 1957.
H. L. McDonald, Technical Graduate - Rotational, transferred in on September 23, 1957.
J. L. Humason, Technician Trainee, transferred out on September 16, 1957.
T. R. Stoner, Technician Trainee, transferred out on September 6, 1957.

PROCESS DESIGN

F. J. Kempf transferred from Technical Graduate - Rotational to Monthly on September 1, 1957.

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HW-52809 DEL

PROCESS DESIGN (Continued)

W. A. Massena transferred from Technical Graduate - Rotational to Monthly on September 1, 1957.
J. G. Herdan, Technical Graduate - Rotational, transferred in on September 16, 1957.
W. D. Pilkey, Technical Graduate - Rotational, transferred out on September 4, 1957.
J. R. Kleigel, Summer Employee, resigned on September 13, 1957.
L. N. Johanson, Summer Employee, resigned on September 18, 1957.

ENGINEERING AUXILIARIES

G. R. Hale terminated on ROF September 30, 1957.

PLANT AND INDUSTRIAL ENGINEERING

S. C. Gettings transferred in on September 23, 1957.
O. M. Lyso, Technical Graduate - Rotational, transferred in on September 23, 1957.
W. A. Wendland, resigned to attend school on September 13, 1957.
W. F. Engesser, Summer Employee, resigned on September 20, 1957.
S. R. VonKrosigk, Technician Trainee, resigned on September 20, 1957, to attend school.

SPECIAL MAINTENANCE

L. J. Livingston transferred from K Reactor Operation on September 2, 1957.
W. K. Herrin resigned September 13, 1957.
L. H. Fischer transferred to K Reactor Operation on September 2, 1957.

PROJECT ENGINEERING

C. L. Owen transferred out on September 1, 1957.
R. E. Gott transferred out on September 1, 1957.
J. G. C. Diehl transferred out on September 1, 1957.
W. I. Rose was not removed for illness as stated in last report.

Trips and Visitations

F. M. Moore of the Barco Manufacturing Company was a HAPO visitor on September 16 and 17 to discuss flexible connector design problems.

Richard Abbott and James Freshour of the American Standard Company, Redwood City, California, visited HAPO on September 20 and 23 to obtain current information on graphite-moderated, light-water-cooled, dual-purpose reactor concepts.

M. H. Schack visited the Bingham Pump Company, Portland, Oregon, on September 4 to discuss proposed 190-K pump modifications. The Electric Steel Foundry Company of Portland was visited the same day to consult with the General Electric inspector there regarding relaxation of tolerances on the CG-558 pump wear rings.

G. E. Wade visited the Lindberg Steel Treating Company, Los Angeles, California, on September 8 to discuss the nitriding of a sample of a vertical safety rod. The Chromizing Company of Los Angeles was visited the same day to discuss methods of surface treatment for carbon steel VSRs.

A. B. Carson attended meetings with Atomic Energy Commission personnel in Washington, D. C., on September 16 and 17 regarding possible new production reactor design activity, gas-cooled power reactor studies, and HAPO classification problems.

E. R. Astley visited appropriate members of the staff at the University of Washington to discuss possible engineering service work and to make arrangements for a part-time teaching assignment in their Engineering Department.

R. S. Hammond, R. J. Brebrick, W. Dalos, E. D. Ayres, E. W. Schilling, A. R. Stubberud, A. A. Maupin, M. L. Faught, V. G. Blanchette, R. W. Powell, W. J. Dows, and F. J. Mollerus attended the A.I.E.E. General Meeting on August 28, 29, and 30, 1957, in Pasco, Washington.

R. L. Roy visited the Heiland Division of Minneapolis Honeywell in Denver, Colorado, on September 6 to investigate oscillograph equipment needed for reactor water pressure pulsation problems, and the Brush Electronics Company in Cleveland, Ohio, to investigate vibration measuring equipment needed for 105-B and 100-K vibration work. In addition, he attended the Instrument Automation Exhibit and Conference in Cleveland, Ohio, from September 10 to 13.

Mr. Clay Bernard, of the Elevator Maintenance Company, Los Angeles, California, visited the Standards Engineering Operation on September 12 to discuss the possibilities of negotiating a contract on elevator maintenance.

Dr. J. F. Murphy from General Engineering Laboratory visited Materials Development on September 3-5, 1957, for consultation on the electrochemical protective coating of vertical safety rods and 3X balls.

H. M. Graff of Beckman Instrument Company visited Mechanical Development B on August 7, 1957, to aid in putting in service the last leak detector.

J. K. Figenshau and W. H. Hainer of General Mills Company, Minneapolis, Minnesota, visited Mechanical Development A to discuss plans for the remote manipulator that they are developing for use at Hanford.

P. B. McCarthy traveled to Portland, Oregon, on September 24, 1957, to inspect fabrication of splines at Oregon Electronic Manufacturing Company and to assist at start of production of splines.

J. E. Robb visited the Freuhauf Trailer Company in Spokane, Washington, on August 5-8, 1957, to discuss engineering design and procurement of charging machine cover.

R. R. Cone was in San Francisco on August 20-23, 1957, to discuss problems concerning the power rate meter and safety circuit instrumentation.

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HW-52809 **DEL**

L. C. Cole attended the I. S. A. Exhibition in Cleveland, Ohio, on September 9-13, 1957, to consult with vendors' engineers about development problems.

J. W. Green visited the Shell Development Company in Emeryville, California, on September 4-6, 1957, for consultation on the completion of the prototype probe for use in process tube inspection. A completed prototype for circumferential inspection was brought back for testing. On September 5 he visited Beckman, Berkeley Division, and Tracerlab, Inc., both in Richmond, California, to discuss subcritical neutron monitoring.

Information Meetings

Information on Paperwork Simplification and Methods Improvement for the charge-discharge operation, 100-K reactors, was presented by Professor W. F. Engesser of Oregon State College at the FEO Information Meeting on September 19.

R. T. Jaske gave a talk at 1704-K on September 17 on "Present Arrangements with Bonneville Power Administration in Connection with Supplying Electricity to HAPO".

At the Irradiation Processing Department Mechanical Engineers Meeting, W. W. Porter presented information on "Application and Use of Strain Gages", as a follow-up on information obtained from a recent two week course at MIT.

A series of approximately 23 information meetings were held to assist Radiation Monitoring management in acquainting supervision and monitors with the purpose of the Radiation Monitoring Planning and Scheduling study, and the means which will be utilized in this study.

Training

The following training courses were attended by FEO personnel during September:

<u>Name of Training Course</u>	<u>Number of FEO Personnel Attending</u>
Process Orientation	3
Effective Business Writing	2
Labor Management Relations	2
EPD Radiation Protection	4
Understanding People	12
First Aid	2
Data Processing	1
Management Orientation	3
Professional Business Management	12

Safety

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

Security

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

Radiation Experience

No radiation exposures to Facilities Engineering personnel exceeding the maximum permissible limit were reported.

II. ACHIEVEMENT

A. Process Design Operation

Existing Reactor Studies

A preliminary design project proposal for the K Area water plant expansion has been completed and forwarded to the General Manager, HAPO, for approval. Additional information and data have been gathered on process piping friction losses and system head curves for I and E fuel loads. Testing of the raw water system has been completed to provide information from which the system requirements curves can be derived. Additional contacts have been made with appropriate vendors to determine if the desired process conditions can be attained by modification of existing equipment.

Development work in support of 100 Area effluent system studies is continuing. An estimate has been made of the cost of a survey of the river between 100-K and 100-D to obtain data from which to estimate radiological contamination at 100-D resulting from an outfall line failure at 100-K. It is planned to authorize this work in the near future.

As the result of a request from Management, work was initiated on a study of the economic and engineering feasibility of converting a K Reactor to electric power production. The major differences between this and previous studies are: (1) the application of more recent technological information, and (2) the assumption that the demand for weapons grade plutonium had diminished and that credit for this product would be at equivalent fuel value.

New Reactor Studies

Preliminary studies of a possible new production reactor design continued during the month. A report was transmitted to the AEC of a design approach which it is believed would result in a concept having a desirable combination of low capital cost per unit of production

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HW-52809 DEL

capability, low unit cost of plutonium produced, and flexibility in regard to possible future economic and technological changes. Additional detailed planning was done as to process design activities in the event that work on such a project is authorized at HAPO. This advanced planning is necessary to meet the stringent schedule requirements which have been placed on this program. Collection of data in key design areas has been initiated. This includes fuel element design and operating characteristics, heat transfer information and instrumentation requirements for the range of process conditions of interest, reactor and primary loop material limitations, and the variation in equipment cost and operating capability with changes in primary loop temperature.

Project Design Activities

CG-558 Reactor Plant Modifications for Increased Production

Two additional 183 pumps were inspected during the month for cavitation damage. One showed no evidence of attack while the other showed some. No firm explanation for such differences has been developed, and no further proposals for corrective action have been received from the vendor.

A 190 pump impeller cast from an 18-8 stainless steel, considered to be more resistant to cavitation damage, was inspected after 800 hours of operation. Extensive pitting was found over most of the inlet vane area. A newly designed impeller has been received from the vendor and will be installed for a trial period. Vendor problems on the fabrication of modified wear rings were resolved during the month.

CG-600 100-C Alterations

Detail design drawings for the test installation of a second replacement pump at 190-C have been completed and forwarded to the field.

CG-709 Improved VSR's, All Areas

The development program for this project continued during the month although information has not yet been received as to the number of rods which will require modification in the various areas. Development activities were concentrated on completion of the prototype assembly for the test tower experimental program and the investigation of materials and rod surface treatment methods.

Significant Reports Issued

<u>Number</u>	<u>Title</u>	<u>Author</u>
HW-50784	Design Test Request No. 1016, Air Accelerated Vertical Safety Rods for Project CG-709, July 1, 1957.	G.E. Wade

<u>Number</u>	<u>Title</u>	<u>Author</u>
HW-52059	Pressure-Flow Characteristics of the 190-105-K System for Use With the 100-K Area Water Plant Expansion Studies, August 26, 1957.	E.R. Rudock
HW-52249	190-C Pump Capacity During CG-600 Pump Installation, September 12, 1957.	D.F. Watson
HW-52274	Energy Generation and Fissionable Isotope Distribution as a Function of the Radius for Fuels at High Exposure, August 27, 1957.	E.R. Astley
HW-52291	General Bases for New Production Reactor Program, September 6, 1957.	A.B. Carson R.L. Dickeman
HW-52343	Temperature Distribution in a Fuel Element as a Function of Exposure, September 3, 1957.	E.R. Astley
HW-52380	Power Production Economic Charts for Dual-Purpose Reactors, August 29, 1957.	D.L. Condotta
HW-52483	Condensation of HW-37965 for Reactor Plant Operation, September 11, 1957.	D. Marinos
HW-52769	Process Tube Stresses Induced by an Unloaded Process Tube-Pierced Crossheader (25-3), September 23, 1957.	W.J. Morris
Conf. U. loc.	Proposed New Reactor Hydraulic and Heat Transfer Conditions, September 17, 1957.	D.L. Condotta

B. Equipment Development Operation

General

In the poison spline program, a partial loading of splines for start-up control was successfully made at D Reactor. Eleven splines of a potentially usable loading of thirty were inserted and removed over a three-day period. Increased production valued at an estimated \$6,000 resulted from use of these splines. Five splines could not be inserted the full distance, presumably from graphite distortion and bowing of process tubes. This start-up test uncovered minor equipment and procedural modifications that are desirable before production use of splines, such as provision of an insertion tool, since some difficulty was experienced inserting the splines by hand pressure. These minor changes are being made. This start-up demonstration is considered generally successful and equipment is being assembled and plans are being made to conduct a full start-up test. Potential problems with the new seals have not developed and three seals have accumulated 51, 51, and 57 days operation at 550 psi pressure in the 189-D flow mockup. Near month's end,

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HW-52809 DEL

at D Reactor two splines were inserted for pile flattening and seven were inserted during a startup to help reactivity balances.

A first prototype of an improved process tube integrity checker has been obtained from the Shell Development Laboratories and evaluation is under way. The probe, demonstrated to Irradiation Processing Department representatives at the Shell Development Laboratories, picked up manufacturing defects in new process tubes. It also showed a chart deflection of one-quarter of an inch for a three-mil change in wall thickness when the wall is between twenty and forty mils. Testing of this probe on installed process tubes has been scheduled. Two other types of probes--one for checking the height of ribs and the other for checking the thickness of the process tube between the ribs--are nearing completion at the Shell Development Laboratories.

On the K gas seal and thermocouple replacement problems, a new high-temperature-resistant silicone appears to be the best choice for an elastometer and electrical insulation. Special specifications have been prepared to make use of all existing knowledge on silicones believed to exist partly at HAP0, partly with the parts fabricator, and partly with the silicone supplier. Value to the customer, environmental conditions, and proposed accelerated tests are stressed in the specifications along with a requirement that production be stopped at 5 to 10 percent completion until the accelerated tests can be performed. Typical specifications include a five-year life, 150 C service, 5×10^6 R radiation dose, thermal cycling from 15 C to 150 C splash service, mechanical damage from handling, etc. As requested by K Area, development was initiated on a metal bellows gas seal as a long-term alternate should the silicone gas seal fail to pass the accelerated tests. A foam-in-place mixer was ordered from American Latex Products and a preliminary model obtained on loan in an attempt to develop a patch method for existing gas seals. Silicone foams have been prepared and several show definite promise; the foam is unicellular and is holding ten inches of air (not helium) pressure. Radiation and physical property testing are under way. Similar development work is under way on materials to coat the existing gas bellows and thermocouples. Problems in application of foam and coatings on the rear face of K Reactor are being studied. No recommendation has been made as to the preferred method for correcting the K gas seal and thermocouple problems, since installation and lost production charges dictate selection of the most simple and lowest risk method.

In the charge-discharge-while-operating program, the installation at C Reactor--inlet and exit ball valves, controls, and rupture detection system--is performing satisfactorily with minor equipment problems. The vertical-crossheader-gamma-monitor system has detected all four ruptures that have occurred in the ball-valve pattern. Development on the charging machine at 108-D Building proceeded through remote operation of magazine handling, optical alignment, machine traverse under both high and low speeds, cross-feed magazine selection, complete coupling of magazine to charge head to process tube, and ball-valve actuation. Current efforts include rewiring of the charge head to make the wiring more accessible for maintenance, revising the photocell-machine-location circuitry, final adjustment of the magnetic switch on the charging

piston and magazine tubes, and exhaustive testing. The aluminum covers for the charging machine have been procured and partially installed. A simple, single-cylinder, back-up charging tube which can be used for charging dummy slugs into an empty tube has been fabricated and is being equipped with an elevator support.

All the basic tools necessary for tube splitting, channel broaching, and tube insertion from the front elevator have been procured. Mechanical transition devices are being fabricated to permit coupling of the tools to the mock-up elevator and process tube on the third floor of the 108-D Building. The rear-face tube wrapper has been debugged and will be reactor tested with the above equipment.

The experimental, process-tube-size, gamma-compensated-octant-monitor chamber installed previous to September 1, 1956, was removed from Tube 0354-F to permit the charging of metal. It was found that this chamber was not deep enough in the reactor to detect sufficient neutron flux for an adequate current signal. Efforts are under way to reclaim the chamber and to provide a longer extension so that the chamber can be relocated to a greater depth.

In the rib height reduction program for I and E slugs, both techniques for removing metal--plowing with sharp-edged rotating wheels, and milling with rotating cutters--continue to show promise in laboratory tests. In the plowing technique, minor problems in cutting the removed metal ribbon and in washing out the scrap chips are believed to be solved. Procurement of parts for full-scale out-of-pile and on-pile testing of both techniques has delayed the final evaluation. At month's end, essentially all required parts have been received.

A circuit has been devised to count the number of vertical safety rods which drop into a reactor. This circuit can be used for ball 3X backup to the vertical rods. If sufficient rods fail to drop into the reactor within a specified time, this circuit will cause the balls to be dropped. Other circuits have been used to provide ball 3X backup to the vertical rods, but various types of equipment failures have caused and permitted a series of spurious ball drops. These unwanted drops have resulted in such a large loss of production that the backup circuits in all of the reactors have been either removed or bypassed.

Two Dow Corning Silicone-916 and two General Electric SE-555 Silicone rubber seals have been installed on four vertical safety rods at KE Reactor for evaluation. The Dow Corning Silicone has a hardness of 50 Durometer while the General Electric Silicone has a hardness of 70 Durometer.

Significant Reports Issued

<u>Number</u>	<u>Title</u>	<u>Author</u>
HW-51836	Effectiveness of External Gunbarrel Shielding Rings, DT-1002, August 19, 1957.	T.D. Dow

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HW-52809

<u>Number</u>	<u>Title</u>	<u>Author</u>
HW-52431	Rear-Nozzle Tip-Off Modification Studies, September 23, 1957.	J.H. Fastabend
HW-52791	Final Report, Design Test 1011, Func- tional Test of Air-Accelerated Verti- cal Safety Rod, Project CG-708, September 20, 1957.	C.D. Emmons
None	Engineering Studies of 189-D Generators, September 5, 1957.	R.S. Hammond

C. Plant and Industrial Engineering Operation

Ten Dewcells were maintained in operating condition at 105-F for approxi-
mately two weeks. Frequent back-pressuring of the sample lines is
necessary to maintain gas flow. A baffle has been designed to divert
the inlet sample gas from blowing directly on the heater windings.
One-hundred of these baffles have been ordered and will be installed
in one of the areas. A portable tool to rewind failed heater coils
in the field was designed, fabricated, and partially tested.

During the month, 86 suggestions were received. Evaluations were com-
pleted on 102 suggestions. At month end, a total of 261 suggestions
were awaiting evaluation compared with 277 suggestions at the end of
August, and a delayed backlog of 77 suggestions was recorded compared
to 98 at the end of August.

The topographic surveys of the 181-B-C and 181-D-DR forebays have been
completed, and the drawings have been prepared. These drawings for
100-B, D, and H Areas are being discussed with the various Power
Managers to determine the course of action to take and to plan a
cleaning program that will include all three areas.

An inspection was completed of the outside block walls of the 185-B
and 190-B Buildings to determine the magnitude of the loose block
problem. About one hundred blocks are loose on all four sides. As
these blocks are removed for repair, other adjacent blocks may also
be loosened. In addition, nearly all of the top layers of four inch
wide blocks on the outside of the steel beams have no mortar between
the top of the blocks and the flange of the steel beam. A layout
showing the location of loose blocks is being prepared.

A "high-spot" inspection of the pre-cast roof slabs in the 190-B tank
room revealed that many slabs have longitudinal cracks in the ribs
varying from a hairline crack to over one-eighth inch. Also, rela-
tively large chunks of concrete have spalled off the ribs of many
slabs exposing the steel reinforcing bars. A detailed inspection of
190-B is in progress now, and a layout sketch showing the condition
of each slab is being prepared. As soon as the scope of the cracked
slabs is established for 100-B, D, and F Areas, recommendations for
the replacement of roof slabs prior to repairing the built-up roofing
will be issued.

Continued study of IPD power needs was carried out in order to optimize on costs of interruptible power. Extension of HAPD's previous 15,000 kilowatt contract was assured by the Bonneville Power Administration through September and a best cut-off date remains to be arranged. In support of previous studies which showed that local generation is the cheapest peaking power, arrangements for the testing of 184 emergency generators for controlling peak demands have been made.

Reactor Engineering calculations were received which indicate that under normal conditions VSR bowing within the reactor due to temperature differences across the diameter of the rod could be approximately 1/4 inch per rod section. This bowing approximation agrees with the conclusions indicated by recent annealing tests. Design recommendations to be used for future procurement or replacement of these rods were made to K Area Maintenance Engineering.

Significant Reports Issued

<u>Number</u>	<u>Title</u>	<u>Author</u>
Undocu- mented	Report of Unfired Pressure Vessels and Safety and Relief Valves, 100-K Area, August 28, 1957.	W.W. Walker
Undocu- mented	Maintenance Delay Study Number 57-5, 100-D Area, August 29, 1957.	E.C. Arbuckle
Undocu- mented	Suggestion Files, Study Number 57-17, August 29, 1957.	E.C. Arbuckle

D. Project Engineering Operation

CG-558 Reactor Plant Modifications for Increased Production

The punch list items have been reduced from 149 to 74 for Phase I in the past two months. Remaining work to complete punch list is estimated at 1,270 man days. The punch list items for Phase II have been reduced from 167 to 103 in the past two months with an estimate of 932 man days required to complete them.

Fifty-six drawings have been revised for "as-builts" leaving approximately 1,080 to be completed.

Work continues on 190 DeLaval process pumps. To date we have received 22 solid rings (one was shipped without inspection and was returned) and 15 split rings with 7 solid and 8 splits enroute. The principal efforts for case ring replacement have been concentrated on 190-DR where examination of first stage impellers has shown the damage to be extreme.

On September 4, No. 2 pump in 190-D was examined for cavitation damage. This pump is the original impeller without wear rings with total operating time of approximately nine months. The examination showed that holes had been eroded in all vanes on the inboard side and three vanes had holes on the outboard side. The holes are approximately one-half

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HW-52809 **DEL**

inch long and range in width from one-eighth to one-fourth inch. The pump characteristics have recently begun to change more rapidly.

CG-600 100-C Alterations

Revision No. 3 to the project proposal requesting funds in the amount of \$835,000 has been approved and the directive issued.

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

During the month there have been several occasions when ruptures occurred in the tubes of the charge-discharge pattern. Circumstances were not timely for discharge to be performed from the control room console during reactor operation. The flush discharges that were made from this pattern during the month--a total of 26--included two incidents in which the ball valves failed to open. No reason was found to explain one failure. The reason for the other failure (a faulty hydraulic line connection) was discovered and the fault corrected.

CG-663 Steam-Driven Auxiliaries, Buildings 165-KE and KW

The electric motors for the forced draft fans on No. 1 boiler in KW and No. 2 boiler in KE have been relocated. Fabrication and installation of piping continues. The contractor has requested an extension of his contract to January 20, 1958.

CG-708 Installation of Additional VSR's, KE and KW

The project cost control estimate has been made based on final design and firm commitments on all engineered materials. The estimate indicates a total project cost of \$336,000.

CA-730 Power House Chimney Repairs, 100-B, D, F, and H Areas

Repairs are continuing on 100-B-C Area power house chimneys. Complete exterior repairs to 100-B-C chimneys have been concluded and minor cracks only were noted and corrected on both stacks. Interior inspection of the No. 2 chimney, 100-B-C Area, showed no deterioration and, consequently, no repairs were required. Outside painting of the 100-B-C chimneys is now in process.

Work was started at 100-D-DR Area and is on schedule.

CG-743 Ventilation Improvements, 165 and 190-KE and KW

The construction bid package was released for bid by the AEC on September 12, 1957. Bids are requested by October 8, 1957. Tests were initiated to determine if venting of the K Area process drains would eliminate the effluent vapor problem in the 165 Buildings.

AEC-160 Recirculating Gas Loop

An order has been placed for procurement of heat exchangers. Construction Operation completed the pour for concrete piers and a floor slab external to 105-DR. The drawings showing the outside facilities for the in-pile tube removal facility have been reviewed and revisions are being made.

E. Principal Engineers

Examination of K Area resistance temperature detectors has disclosed another mechanism of failure in addition to the usual failure by fatigue. The new mechanism is pinpoint and micro-crack leaks that permit water to enter the RTD barrel and short the circuit. The seriousness and prevalence of this mechanism is being determined by further metallurgical work.

Six K-Type VSR sections were successfully nitrided in Los Angeles to harden them. They are being shipped to HAPO for immediate testing in KE.

Progress was made during September in reducing the excess wear of negative slip ring brushes on CG-558 4500-hp synchronous motors. The two sets of trial grade "D" brushes appear to be a substantial improvement and reversing polarity appears to help. Special emphasis has been placed on maintaining the brushes at proper tension.

F. Engineering Auxiliaries OperationProject Proposals Submitted to the Atomic Energy Commission

IR-233 1706-KE Acid and Caustic System
CG-694 Auxiliary Oil Pumps, 190-C
Rev. 1
CG-771 New Production Reactor for Special Nuclear Materials,
Preliminary Engineering Only

Project Proposals Approved by the Atomic Energy Commission

CG-600 100-C Alterations
Rev. 3

Project Proposal Requests Received

New Production Reactor for Special Nuclear Materials, Preliminary Engineering Only
Flux Monitor System, 105-B, C, D, DR, and E
Remote Manipulator for Reactor Discharge Area
Cap Removers for 105-KE and KW

A new routine report has been initiated on a weekly basis which reflects the status of cost for preparation of project proposals.

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Physical Completion Notices for Projects CG-667, 669, 683, 684, and 714 were prepared.

A revised Plant Acquisition and Construction project expenditure pattern was prepared September 6.

HOO-AEC approved nine jobs for plant forces. One review was not submitted to HOO-AEC, but was turned down in the field. Nine assignments are in the process of review.

Revisions of HA Supplements to AEC Manual Chapters 5401, Maintenance Policy, and 6106, Preliminary Proposals and Directives for Design and Construction Projects, were received from HOO-AEC.

G. Special Maintenance Operation

Work Order Data

	<u>August</u>	<u>September</u>
Active Work Orders	63	66
Unexpended Labor Dollars	\$489,271	\$555,730

The name of the Project Maintenance Operation was changed to "Special Maintenance", effective September 1, 1957.

Special Maintenance personnel worked approximately 5 per cent overtime in August.

H. HOO-AEC Requests for Special Information or Services

At the verbal request of the AEC, the first part of the month, P. H. Hutton provided information on noise levels at certain locations. Four manhours were required to collect and transmit the information verbally.

On September 13, a request was forwarded from the AEC (Letter, J. E. Travis to W. E. Johnson, dated September 9, 1957, "Navigation on the Columbia River") through J. S. McMahon's office, requesting information regarding the proposed navigation dam. A letter acknowledging receipt of the request and providing the AEC with the estimated cost of this study was forwarded on September 17.

Manager
Facilities Engineering Operation

October 1, 1957

FACILITIES ENGINEERING OPERATION

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

INVENTOR

SUBJECT

REPORT DATE

None

PERIOD COVERED BY THIS REPORT September 1957

 Manager
 Facilities Engineering Operation

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EMPLOYEE RELATIONS OPERATION
September 1957

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PERSONNEL DEVELOPMENT & PLACEMENT OPERATION

Organization and Personnel

No change in organization structure nor assigned responsibilities of the Operation occurred during the month. Acceptance of our offer of employment to a PhD psychologist during the month will fill the existing exempt roll vacancy. The increase of one in the non-exempt force is the result of an overlap in the replacement of an employee scheduled for removal from the roll next month. The number of people on roll at the beginning of the month and at month end was as follows:

	<u>Beginning of Month</u>	<u>End of Month</u>
Exempt	5	5
Non-exempt	<u>17</u>	<u>18</u>
Total	22	23

No medical treatment injuries and no security violations occurred. Eight hours of overtime were worked in the duplicating function.

Personnel Development

Revision of the Personnel Development portion of the Exempt Employee Appraisal form received major attention during the month. In conjunction with other department representatives a tentative form and discussion plan was constructed. It was agreed that adoption of a uniformly acceptable form on a HAPO-wide basis should await our separate department experiences during the forthcoming appraisal period. In general it is believed that the plan as conceived will provide for more meaningful discussion of self-development needs between a man and his manager and will also provide information that is needed by this Operation in planning development programs for the department. Principal emphasis is placed on self-development to improve present position performance with advancement as a secondary objective.

Other personnel development activities progressed according to previously established patterns. Of special note was the firming up of arrangements to introduce two development courses, "Applied Creativity" and "Creative Approach Seminar", into the department. Samples of student course material was received, an instructor selected, and the necessary material ordered. Actual scheduling of the classes will be started when the course material on order is received.

Classification of specific interests and experiences obtained from a Questionnaire distributed to 450 exempt roll employees was completed. The information can now be keyed into the department's Manpower Register. In a related activity, the assistance of the Financial Operation was obtained in a check of personnel records to correct discrepancies which exist on academic training and institutions from which degrees were obtained.

The PBM-I course progressed satisfactorily with participants in the four groups maintaining an active interest. The four course leaders were scheduled to participate in a PBM Refresher Course, conducted by Mr. Vogel of Manager

Development Consulting Service, during the week beginning September 30.

The forecast for permanent placement of technical graduates from the rotational program during the remainder of the year was compiled. The initial compilation made from separate submissions from each of the Level #3 operations was revised downward to a total of nine for the remaining three quarters of 1958. This compares to the previous estimate of twenty-three for the same period forecast about one year ago. The number of technical graduates on rotational assignment within the department decreased by seven to a total of fifty-one. The status of assignments at month end by operation is shown in the following table:

<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.	11	10	23	0	8
Facilities Engrg.	9	7	14	1	7
B-C Reactor	2	1	2	0	1
D-DR Reactor	0	1	5	0	2
F-Reactor	2	1	1	0	0
H-Reactor	0	0	4	0	2
K-Reactor	<u>5</u>	<u>2</u>	<u>2</u>	<u>0</u>	<u>2</u>
	29	22	51	1	22

No additions were made to the list of exempt employee training courses available in the department. As may be seen from the following table, an increase in total course enrollment occurred during the month:

	<u>This Month</u>	<u>Last Month</u>	<u>Year to Date</u>
Data Processing	13	14	59
Effective Business Writing	7	10	34
Financial Operation Orientation	16	0	45
First Aid	6	6	6
GE Employee Benefit Plans	0	13	65
GE Salary Plan & It's Administration in IPD	0	0	42
GE Wage Plan and It's Administration in IPD	7	0	7
IPD Radiation Protection Program	11	8	28
Labor-Management Relations	7	5	80
Management Orientation	7	0	29
Process Orientation	19	0	55
Safety & Fire Prevention	0	0	18

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	<u>This Month</u>	<u>Last Month</u>	<u>Year-to-Date</u>
Time Card Procedures	0	0	100
Understanding People	49	43	54

No change occurred in the non-exempt personnel development program. The scope and progress of development discussions with non-exempt people in the department is shown in the following table:

	<u>This Month</u>	<u>Last Month</u>	<u>Year-to-Date</u>
No. of Forms Distributed	152	162	1,238
No. of Forms Returned	153	119	954

Testing of candidates in the Supervisory Selection Program was reactivated despite the previously mentioned vacancy in the position responsible for its administration. Four candidates were tested in the facilities provided at the 1760-H Bldg., with five more scheduled in early October. Year-to-date activities in the program is shown in the following table:

New Evaluations Completed	12
Re-evaluations Performed	90
Nominations Outstanding	36
Total Candidates in Active File	178
Appointments from the Program	3

Technical Personnel Placement

PhD Activity

Four PhD candidates were interviewed resulting in two employment offers. Two rejections and two acceptances were received in response to offers previously extended.

BS/MS Recruitment (Experienced)

	<u>September</u>	<u>August</u>
Active Cases Centralized by IPD	3	3
Candidates Centralized by Other Depts.	3	4
Offer Letters Processed	0	0
IPD Offers Accepted	0	0
IPD Offers Rejected	1	1
Offers-Candidates Considering	0	0
New Hires - IPD	0	2

Active participation in BS/MS recruiting remained curtailed in favor of experienced employees being made available by other HAPO components.

Transfers and Terminations

	<u>September</u>	<u>August</u>
Active IPD Cases	17	19
Other HAPO Departments (IPD Interest)	8	7
Transfers, Other Depts. to HAPO	3	2
Transfers from IPD to Other HAPO Depts.	1	0
IPD Transfers to Other GE Sites	1	0
Other Removals	4	2

Transfers into the department included two technical graduates to permanent assignment from the rotational training program and one employee from the availability list in the Construction Engineering Operation. Transfers out of the department included an employee from the Facilities Engineering Operation to the Chemical Processing Department and one from the Research and Engineering Operation to the Jet Engine Department in Cincinnati.

Employment

Fifty-nine service pins were awarded. Thirty-two employees received attendance awards. As of 9-15-57 thirty-six transfer requests were active (10 non-unit and 26 unit). Thirty additions to payroll were made and thirty-six employees were removed from the payroll. Eight open requisitions existed at the end of the report period with five commitments made, two on hold status, and one, no action.

Service Recognition Plan

<u>Years of Service</u>	<u>Number of Awards</u>	
	<u>This Month</u>	<u>FY-to-Date</u>
5 years	16	36
10 years	43	74
15 years	0	0

Attendance Recognition Plan

<u>Years of Perfect Attendance</u>	<u>Number of Awards</u>	
	<u>This Month</u>	<u>FY-to-Date</u>
1	10	14
2	5	12
3	3	6
4	9	13
5	3	6
6	2	5
7	0	3
	32	59

Request For Transfer

	<u>Non-Unit</u>	<u>Unit</u>	<u>Total</u>
On Hand 8-15-57	7	29	36
New Requests Received	4	1	5
Transfers Completed	0	1	1
Requests Cancelled	1	3	4
Interviews Conducted	0	0	0
Requests on Hand 9-15-57	10	26	36

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Personnel Changes - 8-15-57 to 9-16-57Additions to Payroll:

		<u>FY-to-Date</u>
New Hires	0	2
Re-Engaged	0	0
Reactivates	7	10
Transfers	23	41
Re-Hires	<u>0</u>	<u>0</u>
	30	53

Removals From Payroll:

Deaths	2	2
Retirements	1	3
Terminations	16	22
Deactivates	5	11
Transfers	8	13
Lack of Work	4	6
Discharged	<u>0</u>	<u>0</u>
	36	57

Requisitions:

Number of openings as of 8-15-57	13
Additional openings 8-15-57 to 9-15-57	5
Openings Cancelled	2
Number of openings filled	8
*Number of openings as of 9-15-57	8

* 5 commitments and 2 on hold status

Disciplinary ActionSeptemberFY-to-Date

Employee Contacts Received	0	2
Warning Notices Received	0	0
Discharge Notices Received	0	0
Suspension Without Pay Cases	<u>0</u>	<u>0</u>
	0	2

Mail and Duplicating

The projected move of Mail and Duplicating functions to a more central location in the 100-H Area has been postponed indefinitely. Although suitable space is available in 190-H and 1716-H Buildings, renovation costs would be excessive - in view of available funds.

One new Motor Messenger was assigned to the Mail Operation as a replacement for an employee to be removed from the roll next month.

Mail and Addressograph

Graphotype equipment was installed in the Addressograph office, 1709-H Building. This installation should materially accelerate mailing list address changes, additions, and changes in nomenclature essential to the rapid handling and delivery of all department printed communications. The additional equipment will be operated with existing personnel. Plate making cost should be reduced despite

a small increase in equipment rental assessment.

The September issue of the Hanford Works Telephone Directory was delivered to all IPD locations by Mail personnel.

One new sedan delivery was received as a replacement. The new vehicle will provide for increased efficiency and safety during inclement weather this winter.

MAIL STATISTICS

	<u>September</u>	<u>August</u>
Pieces of registered delivery mail	2,732	2,449
Pieces of postal mail	1,064	1,083
Pieces of regular mail	814,026	698,778
Number of addressograph orders handled	31	29
Number of addressograph impressions	14,239	14,347

Duplicating

Accomplishments in connection with the Employee Attitude Survey conducted this month included the reproduction of two communications bulletins and one instruction letter. Mail personnel also assisted in the pick-up and routing of completed survey forms to Data Processing.

DUPLICATING STATISTICS

	<u>September</u>				<u>August</u>
	<u>100-H</u>	<u>100-D</u>	<u>100-K</u>	<u>Total</u>	<u>Total</u>
Orders received	551	242	296	1,052	1,266
Orders completed	551	252	296	1,062	1,279
Orders on hand	0	5	0	5	8
Xerox Masters made	399	200	135	731	801
Total Masters Handled	2,522	804	903	4,072	4,948
No. copies duplicated	186,106	33,773	36,570	256,449	309,836

Verifax

Orders received	14	28
Orders completed	14	28
Orders on hand	0	0
Total Masters handled	752	382
No. copies duplicated	1,749	1,540

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UNION RELATIONS

On August 21, 1957 the National Labor Relations Board rendered a decision dismissing the Hanford Atomic Metal Trades Council's claim that the 13 Engineering Assistants in 1706 KE-KER were performing production rather than research and development work and therefore should be part of the bargaining unit. The NLRB decision stated "that the Engineering Assistants and Technical Trainees working in Buildings 1706 KE and 1706 KER, 100-K Area in the employer's Hanford Works, are not included in the unit of which the Council is the certified collective bargaining representative."

On August 22, the Company received notice from the National Labor Relations Board that a Charge Against Employer had been filed by an employee in IPD, alleging that his supervisor had given him a "bad rating" primarily because of his use of the grievance procedure. The Company's answer to the charge was forwarded to the NLRB on September 12, and requested that a complaint not be issued for the reason that the charge is wholly without merit. On September 17, 1957 a Field Examiner from the Board was in Richland to make a preliminary investigation of the charge.

According to the bylaws of the HAMTC, each of the 20 union affiliates has six votes to exercise in the conduct of Council business. In addition to this basic vote, each local union is allotted one additional vote for each 100 dues-paying members. For many years the Chemical Workers and Operating Engineers have felt that these provisions in the bylaws did not give proper recognition to their per capita support of the HAMTC. In other words, though these two locals represent approximately 50% of the dues-paying membership of the Council, any two small local unions, voting together, can effectively cancel a large union's total vote.

Approximately 90 days ago, the Chemical Workers and Operating Engineers attempted again to get the bylaws revised but were unable to get the necessary votes to accomplish this. They then served notice on the Council to the effect that they were refusing to pay per capita dues to the Council until the bylaws were revised in accordance with their wishes. The Council suspended both locals after a 90-day period of non-payment of dues had expired. Subsequent to the suspension and during the week of September 9, the Council notified the Company that all steward appointments in the Chemical Workers and Operating Engineers were cancelled until further notice.

This action by the HAMTC has created a number of problems for the Company, since much of our day-to-day Union Relations' activity has always been with the stewards of the local unions. Interim procedures to follow for handling grievances have been communicated to supervision. While it is not known at this time what the final outcome of the dissension within the Council will be, it is understood that International Representatives of the two local unions will be in Richland during the week of September 26 in an attempt to resolve the situation.

During the past few months, D-DR and B-C Reactor Operations have been subjected to a campaign of grievances from union representatives regarding jurisdiction and the Chemical Workers' Ratio Agreement. Management in both areas have done a fine job of continuing to do what is right in spite of the unions' resistance. It is anticipated that the number of jurisdictional grievances will increase in

all areas as a result of actual lay-off and rumors of lay-off of craft people from CPD and other departments.

IPD GRIEVANCES STATISTICS 8-20-57 Through 9-16-57

A total of 21 grievances were 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	21	0
Received this year	168	1
<u>Step I</u>		
Answer satisfactory	5	0
Answer unsatisfactory	16	0
Pending time limit	21	0
Settled this month	9	0
<u>Step II</u>		
Discussed this month	9	0
Pending time limit	9	0
Settled this month	11	0
<u>*Arbitration Pending</u>	0	0
<u>Total Settled This Month</u>	20	0

*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.

Subject of September 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>Proc.</u>	<u>Res.& Eng.</u>
Lunch hour	1									
Transfer				1						
Personal Bus. Absence	1									
Overtime	1				1					
SWP Practices			1							
Jurisdiction	1	3	5	1				1		
Ratio Agreement	1		2							
Supervisor's Attitude	1									
TOTAL	6	3	8	2	1	0	0	1	0	0

Bargaining Unit Check-Off Statistics

	<u>Last Month</u>	<u>This Month</u>
Cancellations	9	6
Additions	11	16*
Total Participating	1002	1012
Total in Unit	1472	1468
% Participating	68.0	68.9

*Thirteen of the 16 were transferees into the Department.

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Upon completion of an overall review of trend treatment for the salaries of exempt employees, a total of forty-two interim adjustments were made. This action was necessary to correct a situation wherein the salaries of some exempt people were falling well behind the trend because of unusually long periods between salary adjustment. This corrective action took care of the most extreme cases, but left approximately an equal number to be dealt with early in Calendar Year 1958.

One of the major activities during September was the coding of all individuals on the exempt roll. This is done biennially and will reflect the Department's status as of October 1, 1957.

CHANGES OF STATUS OF PERSONNEL

Transfers into Dept.	3
Transfers out	<u>1</u>
Location Changes	<u>0</u>
Suffix Changes	<u>7</u>
FLSA Changes	<u>2</u>
Reassignments	<u>10</u>
Total	<u>23</u>

CHANGES IN SALARY OF PERSONNEL

Promotional Increases	6
Salary Review Increases	<u>30</u>
Interim Merit Increases	<u>15</u>
Salary Adjustments	<u>1</u>
Total	<u>52</u>

Wage Administration

A concerted study has been undertaken to firm up a decision of whether to make the Chief Operators positions exempt. An audit of existing Chief Operators positions has been completed, a recommendation as to salary treatment under exempt, and discussions with Salary Administration and management representatives of other Departments has been undertaken.

Additional effort has been directed to Engineering Assistant classifications and drafts have been prepared of the data to be submitted to the Commission requesting concurrence in the establishment of Engineering Technician classifications at grade 24. Also, a study has been undertaken in an effort to establish a point evaluation system which can be used by Technical Supervisors, as well as by Wage Administration, to determine appropriate grades for the various Engineering Assistant, Laboratory Assistant, and Engineering Technologist classifications.

CHANGES OF STATUS OF PERSONNEL

Transfers between Depts.	18
Transfers within Dept.	<u>17</u>
Location Changes	<u>0</u>
Reclassifications	<u>23</u>
Total	<u>58</u>

CHANGES IN SALARY OF PERSONNEL

Automatic Increases	107
Reclassifications	<u>57</u>
Merit Increases	<u>2</u>
Total	<u>166</u>

Employee Benefits

Participation in the Stock-Bonus Plan increased 0.1% in August, which reverses the downward trend due to purchase of Richland houses that was anticipated.

Participation in the Pension Plan increased 0.1% as of August 31. Eligible non-participants now total 6. Three emergency loans were made from the Pension Accounts to employees given R.O.F.'s.

	<u>Current Month</u>	<u>7/1/57 To Date</u>
<u>Military Service</u>		
Interviews: Total	4	13
Preparation of Requests for Deferments or Reclassifications	3	10
Returned from Military Service	1	3
Entering Military Service	0	0
Letters Requesting Deferment or Reclassification: Total	3	11
Deferment in S.S.S. Draft	3	10
Reclassification of Stand-by Reserve Availability Status	0	1
Deferments allowed for one year	5	11
Deferments denied for one year	1	3
Deferments appealed (State-Board)	1	3
<u>Employee Purchases</u>		
Special purchases handled by this office	2	6
Complaints by employees investigated and resolved	1	3
Letters written to obtain special G.E. goods	2	5
<u>Retirement Program</u>		
Retired	1	6
Pre-retirement contracts	53	78
<u>Employee Loans</u>		
Educational loans initiated) Discontinued		
Educational loans completed		
<u>Deceased Employees</u>	1	2

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FIRE PROTECTIONOrganization and Personnel

	<u>Exempt</u>	<u>Nonexempt</u>
Employees - Beginning of month	11	41
Voluntary termination.	0	1
Transfer from Relations & Utilities.	0	1
Employees - End of month	11	41

Fire Responses

IPD 1 -- Discarded smoking material.

Description of Fires

IPD - Northeast end of 181-D Building, 100-D Area at 6:28 a.m., September 7, 1957. Fire was found in weeds and trash. This fire was apparently caused by carelessly discarded smoking material. Damage was nil.

Drills Held During September

Outside drills	53
Inside drills.	37
Feet of ladders used on drills	271
Feet of hose used on drills.	11,450

Meetings

<u>Type of Meetings</u>	<u>No. of Meetings</u>	<u>No. Attending</u>
Round Table	3	31
Informative	2	19
Safety	4	38
Security	4	39

General

White Bluffs Station sent two pieces of apparatus to help 200-West Area on a grass fire at Rattlesnake Mountain involving 18 hours exempt overtime and 35 hours nonexempt overtime.

One nonexempt employee terminated voluntarily during the month of September and was replaced by a transfer from Relations and Utilities.

Practice assemblies were held for the Emergency Rescue Crews, one each on September 24, 25, 26, and 27. Assemblies were held to check the efficiency of the notification and response procedure. Complete report of results will be sent to Plant Managers.

A class on Chemox Masks for 14 members of the Power Operation at 100-H Area was conducted. Fourteen members were present at a class held on Artificial Respiration for the Radiation Testing Group at 100-K Area.

Servicemen's Activities

Fire Extinguishers:

Inspected.	752	Handlines inspected.	24
Installed.	4	Handlines serviced.	12
Delivered to new locations . . .	4	Gas masks inspected.	13
Seals broken	31	Gas masks serviced.	2
Serviced	216	Sprinkler system serviced. . .	1
Weighed.	163		

COMMUNICATION

Mass communication activities included the publication of four Management NEWS Bulletins, four "Memos from the General Manager" and eight "Union Relations Information" bulletins; five issues of "Management Information for Foremen and Supervisors" were distributed during September as was one health bulletin and the MONOGRAM. Two priority messages were initiated.

The September issue of the "Round Table Guide" was prepared and issued to approximately 152 supervisors, an increase of about 27 over last month's distribution.

One Management Information Meeting was held by the General Manager during the month.

The General Manager held two Report to Employees meetings in the Jason Lee School Auditorium. Approximately 790 EPD employees attended one of the two sessions.

The Communication Specialist presented three 2-hour workshops on Communication to exempt people in the F-Reactor Operation.

Items for submission to the "GE Review" annual Research and Engineering Developments issue were submitted to R&U's Public Communication Operation.

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	16	13	179
Column Inches	150	189	1907
Text - Column Inches	21	50	292
Total - Column Inches	171	239	2199

One paper was processed for Public Relations review and approval during the month:

"Fast Effect Measurements in Natural Uranium Rod and Tubes and Correlation with Theory" - R. Nilson and T. J. Oaker

HEALTH & SAFETYPersonnel

Employees: Exempt 4. Non-exempt - 1.

Accident Statistics

	<u>September 1957</u>	<u>Year to Date</u>
Disabling Injuries	1	1
Frequency		0.27
Severity		20.29
Medical Treatment Injuries	89	878
Frequency	2.32	2.38
Accumulated hours of exposure since last Disabling Injury (9-3-57)	344,574	

Fire Statistics

Fires	1	8
Losses	0	\$50.00

Security Violations

Research & Engineering	1	10
Facilities Engineering	1	7
Finance	0	4
B Area	0	1
D Area	0	1
F Area	0	1
H Area	0	1
K Area	0	1
Total	2	26

The first disabling injury in 1957 occurred September 3rd, when a pile operator sustained traumatic amputation of the distal phalanx of the first and second fingers of his left hand. The investigation disclosed momentary carelessness on the part of the employee; however, recommendations have been agreed upon which should prevent the recurrence of a similar injury.

The IPD Safety Philosophy for 1958 was released to all supervision.

Concern has been expressed to Operations Management for the frequency of delayed reported medical treatment injuries. Recommendations have been made and, if adopted, should curb this tendency.

E. J. Fitzmaurice
MANAGER
EMPLOYEE RELATIONS OPERATION

FINANCIAL OPERATION
MONTHLY RECORD REPORT
SEPTEMBER, 1957

Administrative Planning

Four new Instruction Organization and Policy Guides were issued during the month on the following subjects: "Control of Source and Special Nuclear Materials," "Essential Material Specifications," "Engineering Standards," and "Authorization and Performance of Work." Revisions were made to Instruction OPGs "Grievance Procedure" and "Promotion or Transfer of Manager or Equivalent Professional Employees." Nine Announcement OPGs and an Announcement Index were revised and reissued.

Three new Advices, "Procedure for Filling Secretarial, Stenographic and Clerical Vacancies," "Procedure for Control of SS Materials," and "Property Management of Special Equipment" were issued, and six previously issued Advices were revised and reissued.

A Subject Index for both OPGs and Advices was released September 16. This cross index includes all subject items and titles for all issued OPGs and Advices to facilitate reference and encourage use.

A summary detailed Status Report on the OPG and Advice elements of the IPD Instruction System was issued to IPD Management on September 13. This showed that 44 of 57 scheduled OPGs, and 119 of 148 scheduled Advices were issued, which with known work in progress, indicates about 80 per cent completion.

Department Management was notified by letter on September 18, of the need for anticipating articles or photographs for the HAPC Annual Report. A list of proposed subjects was attached. No schedule has yet been released.

A Consultant Agreement was executed and signed on September 20 to secure the services of W. F. Engesser of Oregon State College for the balance of the fiscal year. W. W. Windsheimer was named Administrator.

General Accounting

The financial plan for FY 1958 has not been received from the Commission. We have been told by HOO-AEC that the financial plan most probably will not be transmitted to us until December, 1957 or January, 1958.

All funds appropriated for line items in the FY 1958 plant acquisition and construction budget will be held in reserve by the Bureau of the Budget. Proposed projects to be funded from FY 1958 PAC line items will have to be submitted to Washington (through HOO-AEC) for review. Funds held in reserve by the Bureau of the Budget will be released piecemeal as each project is approved.

An interim allocation in the range of \$622,000 to \$952,000 has been made to IPD by HAPC for FY 1958 General Plant Projects. Allocation of the larger amount is contingent upon approval of the project, Improved Ventilation Control - Buildings 105 and 115-B, D and F, in the amount of \$330,000.

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It has been estimated by HAPO that IPD's share of equipment funds for FY 1958 is \$1,418,000. The amount is not a firm allocation of funds to IPD, but it does provide a basis for immediate use of equipment funds and for future planning. A firm allocation cannot be made until the financial plan (indicating the amount of equipment funds for HAPO) is received.

The annual physical inventory of Precious Metals and Special Materials was taken Monday, September 30, 1957. Results of the physical inventory will be issued shortly.

The balance of fiscal year 1957 budgeted funds for Attendance at Meetings of Professional and Trade Societies and Attendance at Offsite Training Courses and Seminars at September 30, 1957 was \$13,391 and \$1,473 respectively.

Product Cost And Budgets

At the request of Level III Plant Managers the customer overtime report has been expanded to include Level IV components. By improving this report and furnishing weekly information for the last month of each quarter, it is expected that duplication of effort by field people will be reduced.

Maintenance management has expressed interest in a cost breakdown by Foreman and Craft which is now being prepared for H Area. It has been determined that the information cannot be supplied for all areas until IBM changes are made which will eliminate the necessity of manual reconciliation of Maintenance costs. Details have been discussed with IBM people and we are confident of a solution.

A reference book of power costs and statistics including quantities and value of chemicals and fuels, evaporation rates, steam generated, water flow data and other frequently used information is being kept up to date for the use of all Financial and other IPD components who may have a use for it. This information will be useful to us in preparing budgets, forecasts, standard costs and evaluating savings reports.

Personnel Accounting

The State of Washington unemployment record was such that a refund (via issuance of a credit) of unemployment taxes paid for 1956 has been made to employers. The State of Washington operates on a reserve fund basis, with unemployment payments and employer contributions being charged and credited, to the fund. The reserve fund is maintained at or below a maximum balance, so that when the unemployment record is good, employer contributions need not be as high to maintain the fund. IPD's portion of the credit is \$56,483, which will be applied to FY 1958 employer contributions until the credit is exhausted. This credit represents approximately 25% of the total IPD tax obligation for Washington unemployment insurance.

An analysis of Good Neighbor Fund participation was made to determine the city of residence and the amounts pledged to specified agencies. 13% of the total contributions are for specified agencies. 79% of the participants live in Richland, 12% live in Kennewick, 2.3% each in Pasco and Benton City, and 4.4% live in other cities and towns.

Auditing

A review of the eligibility of employees and former employees of IPD receiving the Safety Council Award in May, 1957 and of the accountability for the total awards disbursed by Stores was completed.

The annual physical inventory of Precious Metals and Special Materials taken September 30, 1957 was observed.

Work was started on a review of pool car usage and work continued on the Product Cost audit.

Procedures

Assembly and editing of transcripts of the three paperwork improvement clinics conducted by Professor William Engesser has been done preparatory to their reproduction for distribution to those who participated in the clinics.

The task force assigned to study data processing input met and discussed (1) a flow chart of data processing timekeeping input and (2) a variety of ledger sheets used in the general and cost accounting operations. Two members of the group were on vacation.

Manager-Finance

IRRADIATION PROCESSING DEPARTMENT

PD Lee:kd

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