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MONTHLY RECORD REPORT

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IRRADIATION PROCESSING DEPARTMENT

MAY, 1957

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Received OCTI

AUG 24 1992

June 21, 1957

RICHLAND, WASHINGTON

Work performed under Contract No. W-31-109-Eng-52 between
the Atomic Energy Commission and General Electric Company

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IRRADIATION PROCESSING DEPARTMENT
SUMMARY
MONTHLY RECORD REPORT
MAY, 1957

RESEARCH AND ENGINEERING OPERATION

The pilot charging of I & E slugs at C Reactor is continuing at a nominal 50 tubes per month rate. Approximately 465 tubes have been loaded for this program and 316 were in-pile at month end with still no ruptures being experienced. The maximum specific power of these irradiations approximates 60 KW/ft. Three tubes of enriched I & E slugs to pilot their irradiation at higher specific power (90 KW/ft) have reached an exposure of approximately 800 MWD/T.

A recommendation to restrict tube power during startup at C Reactor to 10% below the fuel element failure control point was accepted. Evaluation of the effectiveness of the limit will require further experience.

A test of the F Reactor effluent system revealed that at least seven minutes are required to increase the coolant flow to CG-558 rates without flooding the down-comer vent system.

It was determined that an alternate charging lubricant which has the advantage of not clouding the water in the storage basin can be used economically by supplementing it with an additive. The use of Separan continued to result in successful treatment of water at the increased flow rates required by CG-558 and is proving even more economical than anticipated.

PRODUCTION AND REACTOR OPERATIONS

Input production (Pu) for May was 102.6 percent of forecast and output production was 103.5 percent of forecast. An input production record was achieved at C Reactor, exceeding their previous maximum by 11.8 percent.

The maximum established power level was increased 155 megawatts at F Reactor due largely to increased cooling water following Project CG-558.

Forty-four reactor outages, of which 18 were scrams, resulted in an overall time operated efficiency of 67.1 percent, including CG-558 outages at F then H, with a one week overlap. Forecast was 67 percent.

Sixteen ruptures, eleven regular metal, three cored (1/2" core) and two Production Test (PT-IP-2A, one cored "E" and one solid "E") were removed from the reactors during May. Of the regular metal failures, three were at KE, three at DR, two at H and one each at B, D, and KE. The three 1/2 inch cored ruptures were removed by the "quickie" method, with operation successfully resumed within the scram recovery time; five were stuck.

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Process tubes were replaced at B, F, and H Reactors with 89, 37, and 76 replaced respectively.

Significant items of equipment experience during the month were: (1) a complete ball drop occurred at D Reactor when a sweated joint in a pressure impulse line failed during operation. (2) F Reactor resumed operation May 18, approximately two days ahead of the CG-558 outage schedule, despite the fact that full flow acceptance tests were interrupted by the failure of the seal at the top of the downcomer, the rupture of a 36-inch water line, and a 24-inch cone valve failure at the 183 Filter Building. (3) H Reactor was shut down May 12 for their CG-558 outage. Tube replacement and charge-discharge were completed before starting CG-558 work on May 20. (4) Five process tube leaks and one Van Stone leak were found and corrected. Two tube leaks occurred at B, two at DR, and one at KE. The two leaks at B and one of those at DR were caused by chattering dummies in poison column control facility tubes. The tube leak at KE and the second at DR were caused by ruptured slugs. The Van Stone leak was at H Reactor. (5) Re-inspection of the "B" basin at 107-KE showed the inlet chute cross brace completely loose at one end, necessitating repair before the basin is returned to service. (6) A break in the raw water line supplying emergency water to B and C Reactors was discovered on May 15. Steam equipment was operated in the 183-B and C Pump Rooms to provide emergency back-up while the break was being repaired. (7) Investigation of ground settling at DR Reactor continued. The cause has not yet been determined.

There were no disabling injuries or formally investigated radiation incidents during May. One security violation was incurred.

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

FACILITIES ENGINEERING OPERATION

Process Design

The Plant and Equipment Analysis Report on the proposed "K" water plant modification work was approved and issued during the month. Work on the preliminary evaluation of an organic-cooled, graphite-moderated power reactor has been completed and a summary report prepared for transmittal to the AEC. Project Design activities for the month included improvements to the effluent lines affected by Project CG-558.

Equipment Development

New power tools were procured and demonstrated to Central Maintenance personnel. Development efforts continued in the intentionally-cooked-slug program. Experimental process tube rib reducing techniques for the I and E slug program were studied during the month.

Plant and Industrial Engineering

Approval of a contract for obtaining off-site draftsmen has been delayed. A near-record of 183 suggestions were answered. The entire April 25-26 charge-discharge outage at 105-KW was photographed on motion picture film. Examination of 105-DR

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backfill settlement problems continued. Standards Engineering moved to new quarters in the White Bluffs Instrument warehouse on May 23, 1957.

Project Engineering

During the month Project Engineering has managed or participated in forty-nine projects and engineering studies.

CG-558, Phase I work for 100-B, DR, and D Areas is nearly complete. The official date of the CG-558 shutdown at 100-H Area was May 20, 1957.

Extended testing of the Project CG-600 Byron-Jackson pump is continuing.

Principal Engineers

Examination of a drained 107-A tank in 100-KE shows the bottom of the tank to have adjusted stress by establishing pressure ridges. Examination of stress relieved K Area VSR's continues.

Engineering Auxiliaries

The 100-K history was issued on May 2, 1957. The cost aspects of Architect-Engineering-Management services received considerable attention during the month.

Project Maintenance

Overtime expenditures are still running about nine percent during the current 100-H Area outage.

EMPLOYEE RELATIONS OPERATION

Communication activities were expanded with the start of the oral communication program. Progress in Personnel Development was noted by the increase in the number of requests for the service of the Exempt Manpower Register, the general response to the personal questionnaire sent to exempt employees, and the improvement in the operation procedures of the rotational training programs. Re-evaluations in the Supervisory Selection Program doubled last month's number while the new evaluations were maintained on a current basis. A joint meeting of the four PBM-I classes completed the first series of this course.

The Award of Honor plaque was received from the National Safety Council on May 29, 1957. The AEC-HOO Safety Division recognize this achievement. On May 30, 1957, IPD achieved the second award under the terms of the Safety Award Plan having operated 225 consecutive calendar days without a disabling injury.

There was an increase of three in the IPD nonexempt payroll, with three new hires, seven reactivates, 14 transfers, and 21 removals. Open requisitions increased by two to 16; transfer requests also increased by two, to 33, five new requests being received and three completed. Employee benefits and services activities were concentrated on clarification of policies and assuring more widespread understanding of the provisions of Company plans, particularly those which have had recent revisions or have been affected by recent changes in

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law. The occupancy of Building 1761-H has resulted in a significant increase in our duplicating work load during the month.

There were two fire alarm responses in May: one was a fire which spread from the 100-K burning pit to the grass and the other was a brush fire which started while the West Richland Supply Company was cutting telephone pole guy lines with a cutting torch, burning 100 acres. Fire Protection Officers conducted classes at White Bluffs and 100-B for 68 members of IPD covering chemox masks, treatment of accident victims, and artificial respiration. Fire Protection in conjunction with Health and Safety completed the revision of the Rescue Team Training Manual.

Withdrawal of the 1706-KE-KER labor practice charge without prejudice was officially approved by the National Labor Relations Board Regional Director. On June 4, the NLRB will hold a hearing in Richland to hear testimony concerning work being performed in 1706-KE-KER. The Board will decide whether these Engineering Assistants are performing Production work and hence should be represented by the HAMTC. The first non-unit grievance since reorganization was received from three Engineering Assistants in 1706-KE; the matter was settled satisfactorily at Step I. Engineering Assistants in 1706-KE-KER presented two petitions to supervision: one disclaimed interest in being represented by the union and the other expressed satisfaction with their present non-unit bargaining system.

Salary and Wage Administration items during May included a study of first-line supervisors salaries, and recommendation of policies and equitable practices which will promote improved understanding and acceptance of the salary plan; consultations with other departments of the Company and, to a limited extent, with the duPont Company to reconcile exempt positions and organization and salary practices; reorganization of the Employee Relations Operation; and study of space requirements in the 1760-H Building to accommodate the revised Employee Relations components.

FINANCIAL OPERATION

The first financial review was held on May 16, 1957 for the benefit of all Level III Managers and several of their interested personnel.

Utilization of funds made available under the Professional and Trade Societies Meeting Attendance Control Budget was surveyed, with the apparent balance of non-earmarked funds being re-allocated to those having additional needs. Forecast requirements for FY-1958 are largely complete, with an increase of approximately 20% being desired.

Sixty-eight Savings and Improvement Report items were received from IPD components. These items have been edited, cost calculations completed and dupli-mat masters typed. After receipt of fourth quarter FY-1957 items, the report for FY-1957 will be complete.

Cards certifying receipt of safety awards by employees are being accounted for in order to include the value of such prizes in each employee's taxable income for 1957.

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A report was issued for the audit of General Accounts covering the period September 1, 1956 through February 28, 1957.

A task force studying office automation met twice during the month. This group has, thus far, standardized flow-charting methods and has made brief studies of such source documents as purchase requisitions, second class invoices, and printing and duplicating orders.

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IRRADIATION PROCESSING DEPARTMENT
MONTHLY REPORT OF INVENTIONS OR DISCOVERIES

MAY, 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.

<u>Name</u>	<u>Title</u>
G. A. Newell and J. R. Carrell	Quick Acting, Water-Cooled, Hydraulic Activated Control Rods, May 27, 1957.
D. F. Bolender and J. C. Dahlin	Remotely-Operated Nuclear Reactor Table Closure Equipment, May 15, 1957.

General Manager
IRRADIATION PROCESSING DEPARTMENT

AB Greninger:mfa

RESEARCH & ENGINEERING OPERATION

MAY 1957

VISITORS AND BUSINESS TRIPS

P. C. Daly and D. K. Magnus, Westinghouse Corporation, Pittsburgh, visited HAPC May 1st and 2nd, 1957 for discussions regarding the KAPL-120 Loop.

D. H. Curtiss, Process and Reactor Development Operation, visited the Wolverine Tube Co. of Detroit, Michigan, the New Rochelle Tool Co. at New Rochelle, New York, and the Tube Reducing Corp. at Wallington, New Jersey from May 1 through May 8, 1957 to discuss zirconium tube fabrication.

R. L. Dickeman and L. W. Lang, Process & Reactor Development Operation, attended an AEC Meeting in Washington, D.C., May 7 through 13, 1957.

W. K. Alexander, Process and Reactor Development Operation, visited the Phillips Petroleum Co. at Idaho Falls, Idaho on May 15 through 17, 1957 to review Project CA-681.

J. H. Brown, Process and Reactor Development Operation, visited Montana State College at Bozeman, Montana on May 19 through 22, 1957 to deliver talks before physics and technical groups.

A. G. Blasewitz, Irradiation Testing Operation, presented a paper at the Radiation Effects Symposium, Fort Worth, Texas on May 22 and 23, 1957; and visited at KAPL - Schenectady, New York and Westinghouse Corp., Pittsburgh, Pennsylvania on May 27 and 28, 1957 to discuss irradiation testing and equipment associated with the KAPL-120 Loop.

ORGANIZATION AND PERSONNEL

	<u>Permanent</u>		<u>Rotational</u>	
	April	May	April	May
Management And Administration	4	4		
Process and Reactor Development Operation	27	27	4	4
Process Technology Operation	37	37	2	3
Operational Physics Operation	19	19	8	4
Irradiation Testing Operation	20	19	5	5
Coolant Testing Operation	24	23	2	3
Component Testing Operation	21	21	2	2
	<u>152</u>	<u>150</u>	<u>23</u>	<u>21</u>

Component Testing Operation: R. N. Hettinger, Engineering Assistant, was transferred from the Irradiation Testing Operation and promoted to Engineer II effective 5/1/57. Ruth J. Bewlay, General Clerk, was removed from the payroll on Leave of Absence effective 5/31/57.

Coolant Testing Operation: K. L. Young, Engineer II, was removed from the payroll on Military Leave of Absence effective 5/10/57.

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PROCESS AND REACTOR DEVELOPMENTReactor FuelsI & E Slugs

The pilot charging of I & E slugs continues at a nominal 50 tubes per month rate at C-Pile. Approximately 465 tubes have now been loaded in this program of which approximately 316 remain under irradiation at the month's end. Thirty-three were discharged during the month at an average exposure of 835 MWD/T. No ruptures have yet been observed in I & E fuel elements. The maximum specific power experienced in these irradiations approximates 60 KW/ft.

The initial small-scale loading of I & E slugs in KW-Pile was deferred until next month as a result of priority of other work for shut-down time. Hydraulic testing of the B,D,F I & E slug-tube geometry has been completed by Hanford Laboratories personnel and the initial in-pile tests of these elements are now expected to begin at D-Pile late next month.

Three charges of enriched I & E slugs (1.44 weight percent U-235) and two solid enriched control charges continue under irradiation at C-Pile to pilot the irradiation of I & E slugs at higher specific power. Exposure of the I & E slugs in this test approximate 800 MWD/T; one column was irradiated earlier and it was discharged at 900 MWD/T without failure. These elements are being irradiated at a specific power of about 90 KW/ft which approximates the service required at 98°C bulk outlet temperatures.

M-388 Jackets

The charging of 7,000 fuel elements with aluminum alloy M-388 jackets was completed this month with the charge in B-Pile. Ten of the charges are operating with reduced flow to pilot higher tube outlet temperatures, i.e., 110-120°C. Components from the large-scale order (200,000) are now becoming available and the detailed plans for utilization are being formulated.

The radiological analyses of effluent activities in M-388 jacketed slug loaded tubes is expected to begin next month.

The current status of active fuel element development production tests is shown in Table I below:

TABLE I

ACTIVE PRODUCTION TESTS - FUEL DEVELOPMENT

Test Number	Type Metal	No. of Tubes	Reactor	Goal Exposure	Current Exposure	Remarks
105-586-A	U-Si Ingots	1	B	900		Discharged at 1007 MWD/T.
	U-Si Ingots	4		2 ruptures		Not yet charged.
	U-Si Cored	3		900		Not yet charged.
	Control	4		2 ruptures		Not yet charged.
105-590-A	Extruded Cored	4	C	2 ruptures		Not yet charged - compares performance of extruded and drilled cored slugs.
105-591-A	Cored	1116	KE	650		Authorizes irradiation of production quantities of cored slugs.
105-597-A	Mg-U-Matrix	1	B or D	3000		Not yet loaded. Two enriched matrix slugs, 31 regular slugs.
		1	B or D	6000		Not yet loaded. Ten matrix enriched and 12 natural matrix slugs.
105-620-A-65MT Supplement B	Tru-line	464	C	Normal Goal		Provides for quantity charging of Tru-line slugs.
105-634-A	Cocked Slugs	24 cocked	C	200,400-600		Investigates the contribution of cocked slugs to "hot-spot" failure rates. All charges discharged at goal exposure. Irradiation complete.
		8 control	C	200,400-600		Eight discharged at goal exposure. Irradiation complete.

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TABLE I (Continued)

Tube No.	Tube Material	DC Tube	Reactor Cool Exposure	Current Exposure	Remarks
105-623-A-58WT C-Metal		00	C	Normal Burnout	Load 9-23-56 Ten charges each of double-length and Tri-lined "C" slugs will be irradiated to normal burnout. Inspection on discharge will determine degree of protection from "chattering".
DT-105-623-A Regular			DR	Normal goal	Provides for hand seating of charges loaded on alternate outages. Investigates effect upon failure rate.
IP-1-A	1.44% U-235 I & E Lead Dip	4	C	2 ruptures	about 880
	1.44% U-235 Solid, Lead Dip Canned	4	C	2 ruptures	about 570-800
IP-19-A	Lead Dip Canned I & E	360	C	800 variable	50-750
IP-30-A	1.44% U-235 3/8" cored	4	C	2 ruptures	
	1.44% U-235 1/2" cored	4	C	2 ruptures	
	1.44% U-235 5/8" cored	4	C	2 ruptures	

Tests I & E slugs at conditions comparable to 100° bulk effluent limit operation. One control tube loaded 11-16-56 and discharged after 178 MWD/T for rupture indications - no rupture found. Two control tubes in rupture zone discharge replaced.

Provides for the pilot charging of I & E slugs at C-Reactor. Initial charging rate - 50 tubes/month.

Three failures occurred in 5/8" cored enriched charges at 132, 135, and 195 MWD/T. All other enriched charges discharged because of excessive emission of radioactive gas associated with failures in this material.

TABLE I (Continued)

Test Number	Type Metal	No. of Tubes	Reactor	Goal Exposure	Current Exposure	Remarks
IP-30-A (Continued)	1.44% U-235 Solid	4	C	2 ruptures		
	Solid	12	C	400,600,800	460-490	Four tubes discharged at 415 MWD/T.
	3/8" cored					
	1/2" cored					
	5/8" cored					
IP-42-A	Solid Slugs With M-388 (1% Ni) alloy jackets, lead dip canned	4	H	900	Discharged at goal	Investigates uniform corrosion resistance of M-388 alloy. One C-Reactor tube discharged due to rupture in control piece at 117 MWD/T.
		3	C	600	about 560	
IP-43-A	Lead dip Canned M-388 (1% Ni) alloy	8	KE	400,500,600	about 325	Compares uniform corrosion resistance of M-388 and 1245 alloy jackets. Each reactor receiving material under the test. Also lot charges 20 charges of M-388 jacketed pieces.
		22	KE	Normal		
		12	C	400,500,600	200-280	
		20	C	Normal		
		17	C	Normal (cored)		
		8	D	400,500,600	About 190	
		10	B	300,400,500	about 75	
	Lead Dip Canned M-388 (1% Ni) Alloy Jackets	22		Normal		
		20		Normal (cored)		

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TABLE I (Continued)

Test Number	Test Metal No.	Test Temp. °C	Test Pressure	Test Duration	Test Results
18-1004	1.8 inch O.D. core Three 1.8 inch O.D. core fuel elements. Irradiation being conducted in front-to-rear test holes.	KE	600	About 650	Uranium cores are low hydrogen content dingo U.
18-1004	1.8 inch O.D. core Three 1.8 inch O.D. core fuel elements. Irradiation being conducted in front-to-rear test holes.	KE	600	About 650	Uranium cores are low hydrogen content dingo U.
18-1004	1.8 inch O.D. core Three 1.8 inch O.D. core fuel elements. Irradiation being conducted in front-to-rear test holes.	KE	600	About 650	Uranium cores are low hydrogen content dingo U.

Reactor Physics

Experimental Lattice Physics

No 2000 program work has been performed in the Physical Constants Test Reactor (Hanford Laboratories) this month. Material has been fabricated to support an exponential pile program which will complement PCTR activities; the initial series of experiments to be performed by HLO personnel will be a series involving 1.66 inch O.D. slugs. Analyses of flux traverse experiments performed earlier by Research and Engineering personnel has been delayed by other work but should be largely complete next month.

Theoretical Lattice Physics

The P_3 approximation to the solution of the transport equation has been used to calculate the thermal utilization for twenty-two different lattice arrangements involving combinations of fuel, coolant, and lattice geometries of interest in the IPR program. Remarkable agreement between theory and experiment is demonstrated for the few points for which experimental data are available. Earlier difficulties with dry lattices have apparently been overcome by homogenizing the aluminum and air regions.

A modified method of calculating thermal utilization for cluster lattice arrangements has given good agreement with experiment for the two cases calculated. Instead of attempting to define an equivalent internally-externally cooled slug the rod rings were approximated by a homogeneous mixture of uranium, aluminum, and coolant; in this method no synthetic adjustments of effective radii are required.

Attempts to further improve the calculation of fast effect are continuing but with marginal success. The cross sections of interest have been averaged over a fission neutron energy spectrum and the results used in both a one and multi-group theory for the calculation of fast to thermal fission ratios. The experimental curves agree well with calculations performed at Brookhaven and we have requested their cross section data for use in our formulation of the theory.

I & E Slug Physics

The experiment to compare the conversion ratio of the standard C-Pile I & E slug with that of an oversized I & E core such as might obtain from the hot press technique was completed. These results confirm the two percent increase in conversion ratio in going to the larger diameter core that has been predicted earlier through calculation.

Nuclear Safety

A document, HW-50284, "Total Control Requirements - Hanford Reactors," has been issued, discussing the technical bases for the control criterion that "the reactor must be maintained sub-critical indefinitely upon loss of cooling water."

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Nuclear Safety (Continued)

The present control strengths are insufficient to guarantee this at higher power levels with larger enrichment inventories required for reactivity and to support the less reactive advanced fuel element designs. The reactivity transients associated with the melt-down processes are very small (less than one inhour per minute) and the resulting criticality is of a low order; the only significant effect is a small reduction in time required to melt the uranium whereupon the reactor is permanently "poisoned." A change in criterion to permit "delayed criticality" is to be reviewed with the Advisory Committee on Reactor Safeguards next month.

The experimental determination of "boilout" times, i.e., the spatial distribution of water in a process tube as a function of time after water is lost, is being determined for tube powers ranging to 1250 KW in a B,D,F geometry on a joint IPD-HLO effort. These results, which should be essentially complete next month, form the basis for a more realistic evaluation of the power excursions associated with loss of coolant, the importance of the additional reactivity gain upon loss of water from an I & E slug load, and the requirements for accelerated safety rods.

Reactor Engineering

I & E Slug Loadings

An extreme design of a water mixing element to reduce the high top-of-annulus temperatures was tested at C-Pile and found to be completely effective in mixing flow streams. This particular element mixes the internal and external coolant streams as well as achieving some circumferential mixing of the external stream. It leaves some questions regarding column pressure drop and temperature limits unresolved and therefore, while effective in mixing, has not yet been demonstrated in a process element. Several less extreme designs are now undergoing laboratory tests.

Facilities Engineering is making progress in developing cutting tools to reduce rib heights and in this way achieve a more concentric tube - slug geometry. Out-of-pile tests on short tube sections have been encouraging and equipment for full-scale tests is under construction.

An analysis of the extent to which the process tubes and/or charges at C-Pile would need to be modified to accommodate a large-scale I&E slug load has been made. At present power levels and 5°C inlet temperatures no tubes would require modification where the limiting conditions are assumed to be surface boiling and/or uniform corrosion to the extent of 20 mils. At present power levels and 22°C inlet temperatures about 15 percent of the tubes or charges would require modification in some degree. The modifications increase with a power ascension program until at 98°C bulk outlet temperatures it is likely that all tubes or charges would require some modification.

Poison Column Orificing

The principle of orifice cavitation flow will be used (if cavitation damage tests are satisfactory) to limit flow in poison column control tubes at B, D, F reactors. Tube flow will remain constant for all lengths of poison charges and thus will eliminate the tendency of shorter charge high flow tubes to cause tube damage through slug chattering.

I & E Slug Temperature Limits

Efforts to further define the in-pile flow conditions with I & E slug loadings are continuing. The results are encouraging and indicate that gross damage is not to be expected even for the case of a complete flow stoppage in the central channel. These results are also supported by deliberate rupture tests in out-of-pile loops.

Trip-After-Instability

Numerous transient heat transfers experiments have been performed by Hanford Laboratories personnel which show that the true protection afforded by the Panellit systems is retained at higher power levels. The data are being evaluated and it is expected that elevated tube powers and outlet temperatures will be authorized by early July.

CG-558 Tests

Flow transient tests conducted at F-Pile confirm data obtained at B and D Piles which show a loss in transient shut-down flow as the fly-wheels tend to drive the motors as generators to supply electrical energy for about a second until they separate from their busses. Power loss relays are being installed in the pumps to separate the motors from their busses much sooner.

Bulk Outlet Temperatures

Studies are essentially complete which show that the bulk outlet temperatures at the reactors can be safely increased to the region of 90°C to 92°C. Reports discussing the various aspects of this problem have been prepared.

Reactor Planning

A task force comprised of Hanford Laboratories, Fuels Preparation, and Irradiation Processing personnel has completed an intensive review of the status of organic cooled reactor technology. This group considered fuels, physics, materials, engineering, and operational areas, attempted to define the advantages and disadvantages and, in particular, the risks which would be associated with undertaking an assignment to develop, design, construct, and operate an organic cooled reactor. This detailed study is now in a draft form for comment and discussion and will be documented in about a month.

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Economic evaluations of the expected performance of an organic cooled, graphite moderated concept are nearing completion.

Recommendations regarding exposure levels for Hanford over the next three fiscal years have been formulated by the Commission as based on data developed by the Combined Operations Working Committee. The next meeting of this Committee will be held at Hanford this summer to review these exposure level recommendations.

Radiological Engineering

Radiation Control Experience

There was one technical overexposure to radiation in IPD during May. During routine film badge processing the badge of one Radiation Monitoring employee indicated that he had received a radiation dose in excess of the HAPC seven day limit. A formal investigation was held, but it could not be determined exactly when or how the radiation was received. Since the indicated exposure was only slightly in excess of the weekly permissible limit, the man has been returned to normal radiation work status. This overexposure was the first in the Irradiation Processing Department during 1957. It is reported in detail in HW-50386.

LAPSE OF RADIATION CONTROL DISTRIBUTION BY REACTOR AND OPERATION

	B	C	D	DR	F	H	KE	KW	IPD Total
Processing	1	0	0	1	0	1	0	0	
Maintenance	0	0	0	0	1	2	0	0	
Radiation Monitoring	0	0	0	0	0	0	0	1*	
Reactor Operation-Unassigned	0	1	0	1	1	0	1*	0	
Totals	1	1	0	2	2	3	1	1	11

* The assignment of these two Lapses of Control to a specific building is strictly for reporting convenience. Neither is the sole responsibility of the building indicated.

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

It will be noted that this total for May is considerably below the usual experience. Examination of previous Lapses of Control revealed that a considerable number of the reports were issued on occurrences which were of little consequence. Effective May 1, changes were made in the criteria for judging these Lapses of Control. These changes will eliminate many of the more trivial occurrences which were previously reported as Lapses of Control, but will not reduce the effectiveness of this instrument as a measurement and communications tool.

Seven of the Lapses of Control experienced during May were caused by the spread of contamination to skin, clothing, or to areas outside an existing Radiation Zone. This included one case of skin contamination, two cases of clothing contamination, and four cases of spread of high level contamination outside Radiation Zones. In one of the clothing contamination cases, contamination levels were high enough that the employee involved received a significant external dose of radiation from the contamination.

There were four cases where employees received uncontrolled exposure to radiation or contamination of such a magnitude as to be judged Lapses of Radiation Control. The technical overexposure is included in this number.

Lapses of Control

A review of experience with the Lapse of Control Procedures and Standards reveals that numerous trivial situations are being recorded. The criteria have been revised to raise the contamination level base for lapse of control action from 5,000 c/m to 15,000 c/m.

Advanced Reactor Design

Radiological Engineering participated in an analysis of operational problems which could be expected in an organic cooled, graphite moderated reactor. Included was an evaluation of the radiation levels which could be expected if no jackets were used on the uranium fuel elements in this relatively non-corrosive coolant.

Radiological Instrumentation

Final prints and specifications for an electronic dose integrator have been completed to support the purchase of 80 units for IPD exposure accounting

Project and Design Support

Continuing radiological review, comment, and approval is being given to numerous design, project, and process matters.

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PROCESS TECHNOLOGY OPERATIONREACTOR POWER LEVEL LIMITATIONS

Equilibrium reactor power levels were limited at month end approximately as follows:

<u>Reactor</u>	<u>Limit</u>	<u>Basis</u>
B	950 kw maximum tube power	Fuel element failure control - planned rise program
C	920 kw maximum tube power	Fuel element failure control
D	900 kw maximum tube power	Fuel element failure control
DR	900 kw maximum tube power	Fuel element failure control
F	900 kw maximum tube power	Fuel element failure control
H	Down for Project CG-558	
KE	Tube outlet temperature (104 C)	Tube boiling considerations - trip-before-instability
KW	Tube outlet temperature (104 C)	Tube boiling considerations - trip-before-instability

GENERAL PROCESS ENGINEERING

Process Engineering assistance was provided at F Reactor during the startup from the Project CG-558 outage and at H Reactor during the initial phases of the Project CG-558 outage.

Fuel Element Failure

The recommendation to restrict startup tube powers at C Reactor to ten per cent below the fuel element failure control point was accepted. Performance during the month has been satisfactory; however, several months of operation under these conditions will be required to evaluate the true effectiveness of this procedure in preventing fuel element failure outbreaks of the March 15 and March 30 types.

F Reactor Effluent System

A test to determine the ability of the F Reactor effluent piping system to accommodate rapid changes in coolant flow rates was performed. It was found that coolant flow may not be increased from 25,000 gpm to 65,000 gpm, as after a quick ruptured slug discharge, in less than seven minutes. Rates of flow increase greater than this caused flooding of the downcomer vent system. The test was necessary because the F Reactor downcomer was not replaced during Project CG-558 and was originally designed for the lower coolant flow rates existing prior to Project CG-558.

190-KE Pump Cavitation Test

A process water pumping unit at the 165 Building has been in operation for the past five months under hydraulic conditions similar to those of five pump operation at full speed. The test was undertaken to show the feasibility of five pump full-speed operation and to determine if cavitation damage would result. Examination of the impeller after this five month period of operation revealed that it had undergone very slight or no cavitation damage.

Improved Process Tube Lubricant

During the removal and replacement of uranium from the Hanford reactors, lubricants are used to reduce the wear on fuel element jackets and process tube ribs. Two types of oil are now used. Calol brand oil is normally used because of its low cost. The oil used drains into the basin in which irradiated fuel elements are stored. Calol oil has the disadvantage of causing the basin to become cloudy. To handle the irradiated material in the basin clear water is required. A water soluble oil, Ucon brand, is used when necessary to maintain clear basin water, however this oil is much more expensive than Calol brand oil. Reactor tests have been conducted using an additive (Y-25) to the Ucon brand oil. This additive allows the use of one quarter of the normal amount of oil while still maintaining good lubricating properties. It was concluded that the Ucon brand oil with the Y-25 additive can be used at the same cost as the cheaper Calol brand oil but with the advantage of not causing the fuel element storage basin to become cloudy. A letter has been written to appropriate Processing supervision summarizing the test results.

WATER TREATMENT

General Water Treatment

Water treatment with Separan was continued successfully during May. The cost reduction resulting from the use of Separan is proving to be larger than anticipated while water quality has been uniformly good.

Model Filter Plant Tests

Operation of the model filter plant was continued during the month. Data were obtained concerning filter materials and chemical treatment.

High Rate Water Treatment

Filter plant operation at the high treatment rates made necessary by the CG-558 Program has been satisfactory. Filter runs have been reasonably long and water quality has been good.

PROCESS STANDARDS

Process Control

Two new Standards for the KER facility were added to Process Standards - Reactor, HW-33000, during the month. These were Standards K-030, "Single Pass Operation - Fissionable Material Charged", and K-040, "Recirculation

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Operation - Fissionable Material Charged".

Five revisions to Process Standards - Reactor, HW-46000 B, were issued during the month. These were:

Standard A-020 - "Outlet Water Temperature Limits"

The revision specifies new minimum temperature monitoring requirements. Also included was a provision which allows substitution of a slow temperature monitor traverse for a flexowriter map, when necessary. The same information is obtained by either method.

Standard A-060 - "Horizontal Rod Cooling Water"

Standard B-010 - "Gas Composition - Pressure and Flow"

Standard C-040 - "Graphite Temperature Limits"

New curves were issued for the above Standards to improve graphic presentation. No changes were made in the data presented by the curves.

Standard H-010 - "Handling of Unirradiated Enriched Uranium (U235) Slugs"

The revision provides handling, shipping, and storage requirements for all percentages of enrichment of the "E" metal expected to be processed in the 100 Areas. The revision also contains provisions whereby, under controlled conditions, the space required between shipping containers containing enriched aluminum alloy slugs, and pallets containing "E" metal may be reduced, thus relieving the storage problem.

Three revisions to Process Standards - Reactor, HW-46000 D were issued during the month. These were:

Standard A-020 - "Outlet Water Temperature Limits"

The revision is identical to that issued for HW-46000 B, above.

Standard B-010 - "Gas Composition - Pressure and Flow"

The curve showing allowable Gas Composition vs. Graphite Temperature was revised to reflect the changes made in Standard C-040, below.

The curve showing the Flow Correction Factor vs. Per Cent Helium in the reactor gas was re-issued with no changes to provide a more legible copy.

Standard C-040 - "Graphite Temperature Limits"

The revision authorized an increase of 10° C in the maximum graphite temperature limit to allow economic gains from the greater reactivity of hotter graphite at start-up. Reactor life was not compromised because the previous limit contained a 10° C buffer zone wherein corrective action could be taken before the broad limit was reached. It was considered that there had been sufficient operating experience at the higher graphite temperatures to allow elimination of the buffer zone.

A new Process Standards manual, HW-46000 F, issued May 10, supersedes the HW-33000 manual at F Reactor. The new manual incorporates changes made necessary by Project CG-558 modifications.

Eight Process Change Authorizations were issued to allow temporary relaxation of Process Standards - Reactor. These were:

PCA #191 - "Graphite Temperature Limits - B Reactor"

To maintain desired tube power levels for proper evaluation of post CG-558 slug rupture and physics limitations, the Process Change Authorization permitted B Reactor to operate for a short time with graphite temperatures as high as 20° C above the maximum temperature currently allowed with 45 per cent helium. Reactor life was not appreciably affected since the use of the higher temperatures was contingent upon maintaining helium concentration within a specified range. Also, it was required that additional helium be added to maintain graphite temperature within the limits of the Standards as reactivity permitted. This is another in a series of Process Change Authorizations issued to B Reactor to assist in the function of serving essentially as a pilot plant in solving post CG-558 operating problems.

PCA #192 - "Emergency Water Supply - F Reactor"

On April 22, removal of the temporary construction header used to supply cooling water to the reactor during Project CG-558 modifications necessitated removing the associated high tank from its normal back-up status. This would have reduced the emergency water system below Standard requirements since the other high tank was out of service with a cracked strainer casting. The Process Change Authorization allowed taking both high tanks out of service while removing the temporary header. Pumping and raw water availability requirements were specified for the period of removal. The lower than normal requirements were considered safe because the reactor had been down for an extended period, and therefore the heat generation rate at the time was low.

PCA #193 - "Enrichment - D Reactor"

The Process Change Authorization permitted limited enrichment of D Reactor to compensate for the reactivity lost as a result of the recent reduction in goal exposure. This could be done without reducing reactor safety because over-all reactivity would not be increased beyond that that existed at the higher goal exposure.

PCA #194 - "Water Leak - H Reactor"

Water collection rates at H Reactor remained slightly above the limit in the Standards after completion of the apparently unsuccessful April 19 leak test program. The Process Change Authorization allowed continued operation through May 1 to permit scheduling of Maintenance forces, and to allow a slightly longer operating period with the hope that the hole would increase in size and facilitate detection. The extension was to be terminated if the inlet dew point rose above the inlet water temperature or any significant cold spots appeared.

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PCA #195 - "Poison Column Control Pump - B Reactor"

B Reactor was authorized to interchange or maintain, during reactor operation, a poison column control pump that did not develop sufficient pressure to open the ball valves. The existing Standard does not allow maintenance of the pump during operation because originally, incorrect re-assembly could result in inadvertent flushing of several poison columns. However, with B Reactor's new CG-558 installation, incorrect re-assembly is not possible and pump maintenance during reactor operation can proceed without compromising reactor safety. This change will be incorporated in the Process Standards.

PCA #196 - "Poison Column Control Facility Tubes - B Reactor"

At B Reactor, the front pigtail throttling valve on poison column control facility tubes is downstream of the Panellit sensing line. Therefore, Panellit pressure is approximately equal to front crossheader pressure when this valve is throttled to prevent flushing of slugs while the rear ball valve is open. At this pressure, Panellit sensitivity to downstream plugging is poor. However, by installing an auxiliary gauge on the front nozzle, inlet pressure can be effectively monitored. The Process Change Authorization was issued to relax the requirement in the Standard that the reactor be manually shut down if the Panellit pressure went above the normal high trip pressure. Instead, a manual trip of the No. 1 Safety Circuit was required upon observance of an abnormal tube inlet pressure.

PCA #197 - "Ball 3X Riser Pressure Trips - B Reactor"

The Process Change Authorization permitted an increase in span between the Ball 3X riser pressure trip settings. This allows additional pressure decay time between the two trips, thus reducing the possibility of a ball drop due to inaccuracies or drift in the time delay relay setting. The new settings were determined during trip-out tests conducted at D Water Plant on March 21, and can be safely applied at B Water Plant because the systems are essentially the same. The increased span applies equally well with either 6 or 7 pump operation.

PCA #198 - "Process Tube Replacement - H Reactor"

The air tugger used to pull splitters through process tubes can exert forces up to 6800 pounds if necessary. This is well above the maximum force permitted by the Standards for tube channels adjacent to HCR or VSR channels. Forces of this magnitude are at times necessary, otherwise tube replacement time would be prohibitively extended. Because actual forces used are unknown, a production test was written to evaluate the damage that might occur at H Reactor during pending tube replacement work. To permit accumulation of the necessary data, the Process Change Authorization permitted use of forces up to 6800 pounds in channels adjacent to HCR's and VSR channels during the next tube replacement outage.

Process Assistance

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

Process Standards Operation Engineers participated in the trip-out test conducted at F Water Plant on May 8. Process water LP and LLP trip settings specified for post CG-558 operation were based on data from this test.

Process Assistance

After F Area sustained two cracked high tank strainer chest castings due to insufficient line support during Project CG-558 work, Process Standards Operation requested an investigation of the possibility that high tank strainer chests in the other CG-558 Areas might have been similarly affected. The investigation revealed only the need for additional support under the strainers at C Reactor.

RUPTURE EXPERIENCE

<u>Failure Date</u>	<u>Tube No.</u>	<u>Lot No.</u>	<u>Type Metal</u>	<u>Exposure</u>	<u>Type Failure</u>
5-3-57	0782-DR	K-301	8" Regular	441	Side H.S.
5-6-57	1273-DR	M-259	8" Regular	375	Unclassified
5-6-57	5166-KW	K-559	8" Regular	384	Side H.S.
5-8-57	1881-H	M-249	8" Regular	545	Side H.S.
5-10-57	1859-H	Y-051	8" Regular	449	Split L.
5-11-57	1969-B	*	8"-1/2" Cored Enriched Uranium	841	Unclassified
5-11-57	1984-KE	D-243	8"-1/2" Cored	414	Cap
5-13-57	2570-KE	K-564	8" Regular	238	N.A.
5-15-57	2466-B	Z-260	8" Reprocessed	418	Split L.
5-16-57	4082-D	M-218	8" Regular	470	Cap
5-17-57	2164-B	***	8" Solid Enriched Uranium	781	Split L.
5-25-57	2080-KW	K-550	8" Regular	469	N.A.
5-25-57	2078-KW	K-526	8" Regular	358	N.A.
5-25-57	1876-KE	D-250	8"-1/2" Cored	449	N.A.
5-30-57	2881-KE	D-246	8"-1/2" Cored	537	Unclassified
5-31-57	1783-DR	Z-284	8" Reprocessed	322	N.A.

* Eight-inch, 1/2-inch cored uranium enriched to 0.94 per cent U-235 and irradiated under PT-IP-2A, "Enriched Uranium Conversion Ratio and Stability Test"

*** Eight-inch, solid uranium enriched to 0.94 per cent U-235 and irradiated under PT-IP-2A, "Enriched Uranium Conversion Ratio and Stability Test"

Legend:

Side - Hot Spot - Failure probably caused by local overheating (Hot Spot) and possibly intergranular corrosion.

Split - Failure probably caused by cleavage of the uranium core. Slug split longitudinally (L), diagonally (D), or transversely (T).

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Legend: (Cont'd.)

- Side Other - Failure probably caused by a localized corrosion penetration, e.g. pin hole penetration or unknown mechanism.
- Cap - Water entry at cap or when cap is forced off.
- Unclassified - Failure type does not fit into any particular category.
- N.A. - Information not available.

OPERATIONAL PHYSICS OPERATION

PILE PHYSICS ASSISTANCE

The CG-558 start-up of F Pile and the subsequent operation have been gratifyingly uneventful; reactivity observations have been in close agreement with predictions.

Three Poison Column Control Facility tubes in B and DR Piles have failed and caused water leaks, presumably because of slug chattering; B Pile is currently prevented from carrying out the high temperature graphite annealing test because of two such failures.

The largest immediate problem is the loss of about 100 inhours at D Pile following the Ball 3X drop on 5-5-57; it is estimated that this loss could be caused by 45 - 75 pounds of boron-steel balls retained in the graphite cracks and crevices. Short-term compensation may be made by operating under a process change authorization to temporarily permit graphite temperatures 30 - 50° C over the limit; special magnetic removal equipment will be tried in June. A report covering the physics of this problem is currently in rough draft form.

Routine analysis of every scram recovery start-up was begun; this study will further demonstrate the need for improved instrumentation and provide additional information on the rupture problem; it will also provide reference data to demonstrate start-up control improvement after additional instrumentation is installed.

TABLE I
SUMMARY OF OPERATING DATA OF PHYSICS INTEREST
REPORTING PERIOD FOR MAY, 1957

File	B	C	D	DR	F	H	KE	KW
ECT* In May	1330	1590	1315	1440	1350	1570	2340	2440
12 Mo. Avg. ECT	1300	1570	1385	1430	1330	1561	2340	2375
Equil. Scram Time, Min.**	22	27	30	30	26	65	22	25
No. of Scrams*** & Recoveries	5	4	2	3	2	2	0	0
No. of Non-Scram Outages	4	3	2	4	#	2	4	3

* 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.

*** Includes all instantaneous shutdowns, equil. or non-equilibrium, and "quickie" outages from equilibrium from which recoveries were attempted.

The F Pile CG-558 outage ended 5-18-57 with a relatively uneventful start-up.

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Non-equilibrium conditions prevailed most of this month with five scrams, all with successful recoveries, and four non-scram outages. During the tube replacement outage of 5-4-57, eight columns of cored E - N material were discharged; following a rupture and stuck charge on 5-11-57 the remaining cored E - N material was discharged. All remaining E - N columns (solid E slugs) were discharged 5-17-57 when another rupture occurred.

A number of Poison Column Control Facility troubles developed during the month. A manual #1 Safety Circuit scram became necessary on 4-28-57 after a severe flux unbalance resulted from charging poison in the bottom and far-side after electro-mechanical ball-valve troubles had prevented charging poison in the top. An additional outage was necessary later to discharge the poison used for the start-up when the ball-valves did not function properly. During the temporary poison discharge of 5-13-57 a thin-walled expendable dummy became lodged in the front ball-valve of tube 3681 necessitating a short outage (1 hour) to free the ball-valve. During the rupture outage of 5-15-57 a leak was found in PCCF tube 1181 which apparently was caused by chattering of solid aluminum pieces under high flow conditions. PCCF tube 2781 had a similar leak on 5-17-57. Both of these tubes were left as air columns; tubes in the immediate vicinity are currently limiting the pile power.

A scram transient test was performed on May 4 using the method of shutting down the reactor from equilibrium power to between 1 and 10 MW and holding this level until the reactor went subcritical. The panellit system was not bypassed, and shutdown was accomplished with very little difficulty by stepwise reductions in water pressure.

C Pile - F. C. Franklin

During the period from 4-26-57 through 4-30-57 there were three shutdowns for slug ruptures in three production uranium tubes, one shutdown because of a 151 Building power failure and one shutdown to change an orifice. The three slug ruptures all occurred during non-equilibrium operation and two were successfully "quickied" and recoveries were made. The other rupture was stuck and also caused a tube leak which allowed about 500 gallons of water to enter the graphite stack. Recovery from the shutdown caused by the 151 Building power failure was not attempted because sufficient power could not be restored in time to start up both B and C Piles. B Pile was given priority because it had more scram recovery time. Continuous operation from 4-30-57 to the scheduled outage of 5-20-57 was the longest operating period at C Pile since September, 1953.

The total number of I & E charges in the pile at month end is 316.

Seventeen days of continuous equilibrium operation this month provided some excellent data on the relationship between gas composition and graphite temperature. The observed linear change in temperature of 3.1° C/per cent change in helium over the range from 58 to 72 per cent helium indicates a helium correction factor in the graphite coefficient of 0.0047/% helium. A factor of 0.0037, which was based on less reliable data, was used previously.

PILE PHYSICS ASSISTANCE (Continued)C Pile - F. C. Franklin (cont.)

Transient Data analyses continue to indicate that the C Pile HCR system and saturation xenon effect are currently under-evaluated. An actual rod calibration test will be necessary to resolve this problem; such a test is being planned for some time following the CG-651 outage.

D Pile - G. R. Parkos

During the 4-29-57 outage, five "C" enrichment columns were charged and twelve spline-caps were installed. The reactor was scrammed by a Ball 3X trip on 5-5-57 which was caused by a failure in a pressure impulse line and fitting.

Ball removal work was completed and operation resumed with no metal discharge on 5-14-57. The pile reactivity at first indication on 5-14-57 and throughout the subsequent non-equilibrium operating period was 85 - 115 inhours less than anticipated. On 5-17-57 splines were withdrawn and some PCCF tubes were changed from water to solid aluminum in an attempt to maintain sufficient reactivity in rods for control. Analyses of equilibrium reactivity data indicated that the calculated cold clean reactivity was 70 - 120 inhours less than immediately prior to the Ball 3X trip, and 60 inhours less than it was before the five "C" columns were added. A reactivity loss of this magnitude could be the result of one of three things: A large water leak, large amount of air in the pile, or incomplete ball removal. Analyses of the reactor gas indicated that the air content was normal, and no evidence of a water leak was found; therefore, the reactivity loss is attributed to incomplete ball removal.

A rough estimate of the number of balls, randomly distributed throughout the VSR channels, required to cause the observed reactivity loss can be made from 305 pile measurements. Extrapolated to production pile conditions, 6,000 - 10,000 balls (45 - 75 pounds) randomly distributed would be required to cause the observed reactivity loss.

Calculations were made to estimate the time necessary for burnout of the boron in the balls; of the order of twenty months would be required for 50% boron burnup. Details of the reactivity and boron burnout calculations will be included in a document on this problem to be issued soon. Plans are made to attempt further ball removal. The only removal technique currently considered feasible consists of lowering an electromagnet into the VSR channels and dropping any balls collected on the magnet into the bottom of the channel. The magnet will not be available for the outage and discharge of 5-30-57; it is planned that the needed reactivity would be obtained under a process change authorization to operate the graphite above the current temperature limit by 30 - 50° C until the plutonium inventory again builds up.

DR Pile - R. D. Carter

Six unscheduled outages occurred during the month. Three were caused by panelist trips, and recovery was made in all three cases. Two shutdowns involved regular metal ruptures, one with a water leak, and the other was caused by a tube-leak in a PCCF tube.

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PILE PHYSICS ASSISTANCE (Continued)

DR Pile - R. D. Carter (cont.)

The flattening increased from 1360 ECT to 1440 ECT during the month as long term gains allowed the PCCF tubes to be used.

The main inference to be drawn from hot start-up data analyzed during the month is that the No. 1 Galvanometer does not give the actual rate of rise but instead lags behind - sometimes by a considerable amount. The need for a rate-of-rise meter connected to a Beckman-type instrument appears obvious.

F Pile - D. E. Simpson & C. E. Bowers

F Reactor was started up on May 18, 1957, following a two month CG-558 outage. One scram occurred after approximately 1700 MWH operation was a result of a high trip on the panellit. During the outage four of the 28 poison columns used for turn-around control were discharged to facilitate start-up. After recovery the reactor was operated on a revised poison-run schedule and shut down after the recommended production for the poison discharge. Start-up and subsequent raises brought the power level up to approximately 10 kw average from the arbitrary limits for the ten most productive tubes. Subsequent operation has been gratifyingly uneventful.

On May 24 a scram occurred as a result of an inadvertent Panellit trip; recovery was successful after 26 minutes down.

The newly installed PCCF has had limited use thus far during operation; however, it was used to good advantage upon two occasions. One was to force turnaround, and the other was to charge two tubes with partial poison loadings to improve the power distribution. It is planned to use the facility more extensively in the near future for equilibrium flattening adjustments.

For added back-up protection during the CG-558 start-up a special PC was installed by Facilities Engineering in D test hole. The gamma-shielded chamber was adjusted for a background count of approximately 50 cpm. Following first indication of a rising period on this instrument, the reactor was shut down and the instrument removed. Removal was accomplished in slightly over 1/2 hour, and start-up continued.

The downstream dummy pattern for PCCF tubes has been lengthened to minimize chatter in short charges.

Initial examination of operational and shutdown transients indicates good accuracy in the predicted post CG-558 coefficients.

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

The CG-558 outage began on 5-12-57 after a series of operating difficulties. These included a leak-testing outage on 5-1-57, a panellit jumpering scram on 5-8 during a spline insertion, a rupture outage on 5-8, and a second rupture on 5-10.

PILE PHYSICS ASSISTANCE (Continued)H Pile - G. R. Gallagher & W. R. Smit (cont.)

During the current outage, the "E" column inventory was increased to eighty-seven columns; the latest charges have contained 32 "E" slugs and 8 "D" slugs per column.

Seventeen PCCF tubes will be installed. Thirteen of the 17 will be installed in positions such that their primary function will be for use in poison start-ups. It is anticipated that only six of the 13 will be needed for equilibrium flattening. The additional four PCCF tubes are to be used primarily for equilibrium flattening.

KE Pile - W. S. Nechodom

The maximum power level attained during the month was 2% below that attained last month, and 5% below the record high established in March. The reduction was caused by the "unflattening effect" of metal discharges and the approach to TBI limits.

The reactor was shut down for unscheduled outages on April 30 and May 11 for ruptures of 1/2" cored slugs. "Quickie" procedures were attempted for discharging a rupture under non-equilibrium conditions on May 13, but the charge was stuck and a minimum outage was required to discharge the column and replace the tube.

The reactor was shut down on May 23 approximately 9 hours before a scheduled outage because a flux and reactivity cycle caused tube outlet temperatures to reach and exceed TBI limits on the far side. The shutdown occurred at the end of 20 hours of non-equilibrium operation which was apparently caused by the insertion of excessive control rod into the center of the reactor and a resulting power shift to the fringes. During the ensuing non-equilibrium period several large cutbacks in power level were necessary to maintain tube outlet temperatures within limits, and the reactivity loss and control rod withdrawals which resulted from the cutbacks caused the flux to cycle to the far side of the reactor.

The low level pile period system continues to perform poorly; the circuit revision mentioned last month has been completed but spurious indications are still obtained from both the "hot" and "cold" chambers.

Plans are proceeding to change No. 18 HCR from a full rod to a half-rod at KE Reactor. After the start-up on May 25, No. 18 rod will be fully withdrawn and locked out to permit radioactive decay until the next outage. At that time a spare half-rod will be substituted for the long rod presently in No. 18 position. It is hoped that this change will provide better pile flattening in the bottom of the reactor, yet maintain the cycle damping effect of the "fringe" rod pattern.

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PILE PHYSICS ASSISTANCE (Continued)

KW Pile - D. E. Goins

The operating continuity of KW Reactor was interrupted by one scheduled outage on 5-22-57 and two ruptured slug outages of minimum duration which occurred on May 6 and May 25.

Following the 5-22-57 outage a horizontal control rod calibration test was performed in accordance with Production Test IP-76-C. Prior to this shutdown a severe front-to-rear graphite heat cycle was in progress which had been increasing in magnitude since it started on May 18.

During the HCR calibration test on May 23, No. 68 VSR latching solenoid burned out and the rod was tied out until May 26 when repair was effected and the rod was returned to service. The increased VSR usage during the HCR calibration test contributed to damaging eight VSR gas seals which resulted in high reactor gas usage until the seals were replaced.

A rough draft of Production Test IP-82-C, "Low Level Quickie Testing" was completed this month. The final version should be finished early next month.

PROCESS PHYSICS STUDIES

K Pile Horizontal Rod Calibration - PT-IP-76-C

The subject production test was both approved and successfully carried out at the KW Pile during the month. Approximately the first four hundred inhours of various insertion orders of the K Pile HCR system were calibrated during a twelve hour interval. Ninety low level periods and two front-to-rear and side-to-side flux traverses were carried out during this time. The following start-up and turnaround were accomplished at a constant low level without temporary poison in order to provide control strength data on the rest of the system. The new calibrations were in surprisingly good agreement with those deduced from the basic configuration calibrated during the initial KE start-up.

The sub-critical monitoring appendage to this test had to be performed with the rods in the pile instead of out; use of the cross-under line for charge discharge requires by-passing of the ELP trip, so automatic rod insertion in case of water loss could not have been assured under the proposed test conditions. It should be possible to carry out a similar test at one of the other areas without this complication.

Safety Control Studies

Calculations of enrichment limits are being extended to consider the effect of HCR's already inserted in the pile. The calculational methods will be documented to provide the pile physicists with a consistent method of administering process standards requiring some horizontal rod in the pile during cold start-ups if enrichment is increased. At times other than cold start-ups, and possibly secondary cold start-ups, either xenon inventory or the amount of horizontal rod already inserted could be counted on for additional control up to the time of uranium melting.

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

Reactivity effects of a mockup of a 10" section of DR-H VSR-Ball 3X geometry were measured in the Hanford Test Pile. The ball column appeared to be approximately 10% more effective than the rod, whereas the rod surrounded by balls appeared about 20% more effective than the rod alone; presumably the moderator in the rod causes this increased effectiveness in the mixed case. The test was successful in demonstrating that a comparison between single rod and ball channel in a production pile might show significant differences.

Supplementary Control

A production test to authorize the use of new spline removal equipment is being circulated for signature; this equipment is intended to permit sufficiently rapid removal of splines to make this system attractive for start-up transient control.

The appropriations request to permit each reactor to purchase the spline supplementary control system has been approved. Because of limited testing it was justified at this time on equilibrium control benefits only.

A testing program is currently being planned to demonstrate at one pile the transition from PCCF use to splines.

Fringe Poison Testing - FT-IP-14-AC

A maximum DR top biological shield temperature of 167° C was reached early in the month, but during most of the month the maximum temperature has been less than 130° C because of short operating periods. These temperatures compare to the maximum of 195° C reached at a somewhat lower level prior to top fringe poisoning.

Flux traverse equipment and data taking are being scheduled to permit charging of a test mint poison loading in the DR far side during June.

The test supplement calling for depleted uranium in the top of D Pile has been re-called and re-written for B Pile where the top shield temperatures are warmer. Initial F Pile top shield temperatures post 558 appear to be closer to those at D, with maximum top biological shield temperatures around 100° C.

A borescope examination was made of the top biological shield at H Pile through the small holes drilled for shield thermocouples. Although the actual extent of masonite deterioration could not be determined because of drilling residue, it appeared that no noticeable shifting of steel plates had occurred in spite of masonite shrinkage in the inner layers due to deterioration.

Potential Gains Data

Start-up losses averaged approximately 1% higher during this reporting period than normally; equilibrium losses averaged about the same as usual. The larger start-up losses at C and KE Piles were due to the large number of outages, six

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PROCESS PHYSICS STUDIES (Continued)Potential Gains Data (cont.)

and four respectively. B Pile with five outages had substantially greater losses primarily because of ball valve system mal-function which detracted from its supplementary control advantages.

The higher than normal equilibrium losses at KE Reactor are primarily a result of under-enrichment combined with the general lack of central zone reactivity because of the cored loading.

The flattening efficiency was very good at the B, D, and DR Reactors which now have the poison column control facility and also have lowered goal exposures. Although reducing goal exposure provides less reactivity for flattening flexibility, it has the stabilizing effect of reducing the amplitude of discharge reactivity cycles.

POTENTIAL GAINS¹ - OPERATIONAL PHYSICS ASPECTS
APRIL 16 THROUGH MAY 15, 1957

Reactor	<u>B</u>	<u>C</u>	<u>D</u>	<u>DR</u>	<u>τ^2</u>	<u>H</u>	<u>KE</u>	<u>KW</u>	<u>AVE.</u>
<u>Equil. Potential Under Existing Limits³</u>	1.3	3.3	0.9	0.9	-	4.5	9.2	1.9	3.1
<u>Non-Equil. Potential⁴</u>									
Operating Potential	11.0	6.1	3.4	5.5	-	2.5	7.0	5.4	5.8
Temp. P. Outages	<u>1.1</u>	<u>0.0</u>	<u>0.8</u>	<u>0.0</u>	-	<u>0.6</u>	<u>0.0</u>	<u>0.0</u>	<u>0.4</u>
Total-Start-up Control	12.1	6.1	4.2	5.5		3.1	7.0	5.4	6.2

1. A complete explanation of these losses is given in HW-47602, "Determination of Potential Operation Gains".
2. F Reactor was down for its CG-558 outage during the report period and is not included in the reported averages.
3. Per cent to be gained if desired flattening changes could be made.
4. Per cent to be gained through complete elimination of non-equilibrium losses.

Significant Operational Physics Document Issued During Month

1. HW-47621, "Technique of Calculating Reactivity Transient Behavior at D Reactor", G. R. Parkos, May 2, 1957.
2. HW-48451, "Supplementary Start-Up Control", J. C. Peden and G. F. Owsley, 4-8-57.
3. HW-49690, "Mathematical Tables", Pile Physics Operation, 5-15-57 (this is an unclassified version of the xenon tables based on the calculational method proposed by J. O. Erkman).
4. HW-49721, "PT IP-76-C Horizontal Rod Calibrations KE-KW Pile", E. H. Lockwood, 4-18-57.
5. HW-49849, "Reactivity Balance and Associated Reactor Physics Data, April, 1957", S. R. Stamp, May 1, 1957.
6. HW-50291, "Conversion Factors for Depleted Uranium", W. L. Bunch and L. W. Lang, 5-21-57.

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IRRADIATION TESTING OPERATION

KAPL-120 LOOP

The in-pile tube continued on process water cooling throughout the month. A second decontamination run was made on the ex-pile piping, obtaining a decontamination factor of 1.7. This compares with a factor of 2.1 obtained on the first run and factors of 4 to 5 obtained in laboratory tests by WAPD. The only apparent explanation for the difference between the decontamination factors obtained on the loop and the results reported by WAPD are unknown differences in degree and type of contamination. Samples of the decontamination solution showed that cobalt-60 is the major contributor to activity. Following the removal of tubing samples from the loop (inserted to determine the effects of the decontaminating solution), the loop will be given a pressure test at 3750 psi.

The electric power supply system is being reviewed for possible changes to improve safety and reliability of operation. Line heaters to replace those which have failed are being procured and will be installed prior to start-up.

The design of equipment for in-pile testing and discharge of the instrumented WAPD fuel elements is complete and fabrication is proceeding. Charge and discharge mock-up tests will be performed when the equipment is completed. Target date for installation of the elements in the loop is June 24.

NEUTRON FLUX STUDIES

Based on past Hanford Test Pile test results, a procedure has been developed to enable determination of test specimen volume average fluxes by performing a P-3 calculation on the 650 IBM computer.

100 DR RECIRCULATING GAS LOOP

Copies of all prints were delivered to AEC-HCO for transmittal to Army Power Branch. It is anticipated that ground will be broken for the outside facilities prior to June 1. A document, HW-50205, 100-DR Recirculating Gas Loop Data, R. E. Baars, dated May 15, 1957, summarizing loop data pertinent to preliminary test planning was prepared at the request of APB and copies were forwarded to AEC-HCO for transmittal to APB.

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HAPO FUEL ELEMENT IRRADIATIONS

The coolant channels of seven (7) I & E charged tubes are being monitored at C pile.

Goal exposure was achieved for the three IPD fuel elements (HAPO 196) which were irradiated in front-to-rear test hole 3865 KE and the pieces were discharged. Since there are currently no authorizations for future tests, this tube was charged with B metal in cooperation with the Plant Scheduling Operation.

The irradiation of two (2) cluster fuel elements (HAPO 195) continued throughout the month in front-to-rear test hole 3674 KE. A goal exposure increase from 600 to 1000 MWD/T was approved. The pieces had accumulated about 60% of the new goal as of May 16.

Delivery of 2.1" I.D. tubes to be used for irradiation of full length charges of IPR fuel elements in the front-to-rear test holes is not anticipated before July 1, 1957. Fabrication of auxiliary components and equipment required for installation is under way and will be complete in advance of receipt of tubes.

IN-PILE EXPERIMENTS

The third and final safety fuse experimental assembly (HAPO 162) was charged in-to DR reactor on May 28.

Three (3) assemblies containing candidate organic coolants (HAPO-209) were irradiated during the month in the KW Snout facility. These assemblies rely upon irradiation heating to achieve desired temperatures. Goal temperatures were not achieved. Future assemblies will be modified in the light of this experience, to provide the desired temperatures.

Flow mock-up studies supporting the proposed irradiation of natural uranium coupons (HAPO 173) in the KW Snout Facility have been completed.

An experiment was performed in the KW Snout Facility to measure irradiation heating in 2S aluminum (HAPO 112). A heat generation rate of 0.27 watts/gram was measured for an adjacent tube power of 1150 KW. Measurements taken while charging indicate the rate of heating is not a linear function of tube power. Analysis of data continues and a report will be published.

Fabrication has been completed on assemblies designed to measure, during shutdown, the internal temperatures of I & E fuel pieces (HAPO 198). Flow mock-up studies will be conducted when suitable flow measuring devices become available.

OTHER IRRADIATION TESTS

1. A total of eleven (11) sets of activation analysis samples were irradiated in the Poison Column Control Facilities at DR pile. These samples are identified as follows:
 - a. Eight (8) sets of HAPO 184 samples in support of a Washington Designated Program assigned to HLO.
 - b. Two (2) sets of HAPO 202 samples supporting a study of impurities in organic coolants. (HLO)

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- c. One (1) sample of effluent water residue supporting a study of isotopes in effluent water. (HLO).
2. Thirteen (13) graphite samples were discharged from the B magazine facility (heated) at KW (HAPO 119).
3. Seven (7) isotope samples were charged and two (2) samples discharged from the 2D test facility KW pile. This activity is in support of the Radioisotope Distribution Program carried on by the Oak Ridge National Laboratory.
4. Twenty-five (25) cobalt slugs were discharged from H pile and shipped to KE basin. These pieces will be used as sources for a gamma facility to be put into operation soon.
5. One-hundred and twenty-two (122) samples began exposure and one-hundred and fifty (150) samples completed exposure in the HAPO KE gamma facilities.
6. Three (3) AF-100 canisters began exposure and five (5) canisters completed exposure in the KE Air Force gamma facilities.
7. The initial ten (10) KAPL 123 pieces were charged into tube 3483 DR. These pieces are slugs containing small fuel pieces surrounded by NAK to provide a suitable heat transfer pattern.

TEST FACILITIES

A review of current procedures is being conducted in an effort to improve the methods of removal and replacement of K pile front-to-rear test hole tubes.

The contract for modification of the Irradiation Testing Operation's Laboratory (105 KW) has been awarded. It is anticipated that active work will begin during June. Completion is required 90 days after date of Notice to Proceed.

The Appropriation Request authorizing the fabrication and installation of the Hanford Cobalt Facility has been approved. Work will begin immediately.

Fabrication of parts for revision of the Pneumatic Facility (KE pile) is proceeding. The revision will permit using the facility for a portion of the irradiations presently accomplished in the Quickie Facility (E test hole at F reactor).

BORESCOPING RESULTS

During the H pile outage of 5-14-57, three (3) process channels were borescoped before and after broaching. Two channels showed little effect from the broaching operation, the third, 2880, showed considerable damage as a result of broaching. Forces up to 6500 pounds had been exerted pulling the broaching head through the channel.

VERTICAL BOWING MEASUREMENTS

Vertical bowing measurements were made from the front and the rear on three B pile tubes and from the front on three H pile tubes. Results are tabulated below. Distances are measured from the front (rear) vanstone.

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Date	Tube	Results
5-10-57	4454 B Front	Up .03" at 10' since 12-4-56 Down .22" at 19' since 12-4-56
5-10-57	4574 B Front	Up .05" at 10' since 12-4-56 Down .16" at 16' since 12-4-56
5-10-57	4391 B Front	Up .10" at 10' since 12-4-56 Down .11" at 19' since 12-4-56
5-10-57	4454 B Rear	Up .04" at 10' since 12-4-56 Down .11" at 19' since 12-4-56
5-10-57	4574 B Rear	Up .03 at 10' since 12-4-56 Down .18" at 18' since 12-4-56
5-10-57	4391 B Rear	Up .05" at 10' since 12-4-56 Down .08" at 18' since 12-4-56
5-19-57	4674 H Front	Down .08" at 10' since 1-10-57 Down .08" at 22' since 1-10-57
5-19-57	4354 H Front	Down .06" at 10' since 5-29-56 Down .22" at 22' since 5-29-56
5-14-57	4393 H Front	Down .02" at 10' since 5-29-56 Down .19" at 22' since 5-29-56

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COOLANT TESTING OPERATION

Coolant Testing Operation activities were directed toward the operation of the 1706-KE in-pile and out-of-pile facilities and the start-up of the KER loops for in-pile recirculation with heavy metal.

MOCK-UP TUBES

Operation of the mock-up tubes continued in accordance with established programs, including the testing of low pH coolant, M-388 jacketed slugs, and Barco pigtails.

ELMO LOOPS

Operation of the ELMO loops continued in accordance with established programs. Significant information or activities are as follows:

ELMO-1 - The raw water heat exchanger, Development Test #63, operated intermittently throughout the month. Considerable difficulty was experienced with vapor locking due to boiling in the loop.

ELMO-5 - The loop was restarted following extensive modification, and is operating for corrosion testing of materials at pH 8.0.

ELMO-7 - The loop was started up and operated for the purpose of:

- a. Flow testing a nineteen element PRPR fuel cluster.
- b. Flow testing KER prototype cow and elephant slugs.
- c. Corrosion testing of an electrically heated aluminum dummy element under heat transfer conditions.

ORA LOOPS

ORA-1 - The out-of-pile organic corrosion loop was operated with unirradiated MIPB at temperatures to 310°C, with a time operated efficiency of 43%.

ORA-3 - The loop was modified and operated to test the suitability of KER air operated valves for use with organic coolants.

CONVERSION OF KER LOOP #1 TO ORGANIC

Work accomplished during the month was as follows:

- a. Revisions to cell piping were completed.
- b. System flushes were initiated.
- c. The batch still was completed with the exception of the electrical tie-in and operational testing.

d. Detail design is 90% complete.

The only significant change in criteria will be the use of nitrogen as a system pressurizing gas vice the helium originally scheduled.

The M-257 aluminum tubes have arrived on site and a testing program has been established, to evaluate acceptability for in-pile use.

ALLIED ACTIVITIES

The Navy, Bureau of Ships, and the Naval Reactors Branch, Atomic Energy Commission, have released the Brookhaven in-pile organic loop, 6140 pounds of monoisopropylbiphenyl, 2000 pounds of biphenyl, and other materials, for transfer to HAPCO. The cost of the transfer will be confined to packing and shipping charges.

KER FACILITY

The cause of the two previously reported pump failures occurring in cell 3 has been established as impeller failures. The failure, apparently due to metal fatigue, results in the hub separating from the first stage impeller. In the first case the failure of the impeller resulted in the fracture of the upper bearing and damage to the shaft journal. The problem has been referred to Westinghouse for evaluation, however, in the interim, the Coolant Testing Operation is modifying one of the pumps to provide a stronger impeller-hub connection.

KER loop #1 was charged with heavy metal and in-pile recirculation initiated at 11:29 a.m., May 25, 1957. The loop is charged with M-388 jacketed 1/2" production fuel elements with collapsible ribs. Equilibrium operating conditions are 850 psi, 200°C, pH 4.5 to 5.0, with phosphoric acid addition.

Loop #2 operated satisfactorily on in-pile recirculation and dummy loadings until the KE reactor outage of May 24. In-pile recirculation was discontinued to allow for repairs to leaking drain valves, evaluate the status of the canned motor pumps and make final preparations for in-pile recirculation with heavy metal.

Loop #3 remained shutdown to allow for the repair and/or modification of the canned motor pumps.

The KER electrical instrument supply continues to produce minor fluctuations which cause surges on the KER control instrumentation. The problem remains under investigation. The spontaneous pulses received on the delayed neutron instrumentation have apparently been corrected by removing the instrument cables to a separate duct.

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COMPONENT TESTING OPERATIONIRRADIATED MATERIAL EXAMINATION AND FACILITIES

Detailed examination of forty-eight tubes of irradiated metal was completed during the month. This increase in through-put was due to the satisfactory operation of the 105-C Metal Examination Facility.

In view of the \$415,000 cost estimate for Project CG 689, Slug Saw and Etch Facility, the justification and desirability of such a facility was re-examined. A related Project CG 682, High Level Examination and Cut-off Cell, may well serve our requirements, hence Project CG 689 was cancelled.

PROCESS TUBE CORROSION MONITORING PROGRAM

Twelve pile process tubes were examined in the basin facilities, eleven irradiated and sections of twenty-five new K-Area process tubes were measured in the Metallurgical Laboratory. The new tubes were measured to confirm the wall thickness values used in our interim reports. Examination of the poison column leak tubes 1181-B and 2185-DR revealed that the leaks were caused by slug chattering. Because of this fact, all of the poison columns at DR have been measured in-pile using the Probolog and it is planned to measure certain poison columns at B reactor.

In-pile measurements of 173 process tubes were completed using the Probolog. Processing personnel at H reactor use these results for tube removal, and of 128 tubes measured only 75 were replaced. Time required to make these measurements averaged 2½ minutes per tube. Of 41 tubes measured at B reactor, only 32 were found containing wall thicknesses such that they should be replaced. Four tubes were measured at C reactor since they will be charged with I & E slugs.

Listed below are the reports containing details of tube examinations:

<u>REACTOR</u>	<u>REPORTED IN</u>
B, C & H	HW-50064 (Secret)
B	Report #50, HW-50142 (Unclassified)
H	Report #51, HW-50221 (Unclassified)
C	Report #52, HW-50295 (Unclassified)

PANELLIT PROGRAM

Failure analysis was performed on 124 Panellit gauges and 1920 gauges were Process inspected. In-board inspection of 92 gauges was conducted at D Area, and two were found to contain minor defects.

Concern has been expressed regarding the possibility of mercury attacking the platinum components in the DT-100-T Hamlin switches. This problem was thoroughly investigated, including spectrochemical analysis of the mercury pool in four switches. Results indicated that if such an event occurred, it would require many years to be serious enough to affect the function of the gauge.

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 May 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

MANAGER, RESEARCH AND ENGINEERING
IRRADIATION PROCESSING DEPARTMENT

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DECLASSIFIEDPRODUCTION AND REACTOR OPERATIONS SUMMARYMAY, 1957

Input production (Pu) for May was 102.6 percent of forecast and output production was 103.5 percent of forecast. An input production record was achieved at C Reactor, exceeding their previous maximum by 11.8 percent.

The maximum established power level was increased 155 megawatts at F Reactor due largely to increased cooling water following Project CG-558.

Forty-four reactor outages, of which 18 were scrams, resulted in an overall time operated efficiency of 67.1 percent, including CG-558 outages at F then H, with a one week overlap. Forecast was 67 percent.

Sixteen ruptures, eleven regular metal, three cored (1/2" core) and two Production Test (PT-IP-2A, one cored "E" and one solid "E") were removed from the reactors during May. Of the regular metal failures, three were at KE, three at DR, two at H and one each at B, D, and KE. The three 1/2 inch cored ruptures were removed by the "quickie" method, with operation successfully resumed within the scram recovery time; five were stuck.

Process tubes were replaced at B, F and H Reactors with 89, 37 and 76 replaced respectively.

Significant items of equipment experience during the month were: (1) a complete ball drop occurred at D Reactor when a sweated joint in a pressure impulse line failed during operation. (2) F Reactor resumed operation May 18, approximately two days ahead of the CG-558 outage schedule, despite the fact that full flow acceptance tests were interrupted by the failure of the seal at the top of the downcomer, the rupture of a 36-inch water line, and a 24-inch cone valve failure at the 183 Filter Building. (3) H Reactor was shut down May 12 for their CG-558 outage. Tube replacement and charge-discharge were completed before starting CG-558 work on May 20. (4) Five process tube leaks and one Van Stone leak were found and corrected. Two tube leaks occurred at B, two at DR, and one at KE. The two leaks at B and one of those at DR were caused by chattering dummies in poison column control facility tubes. The tube leak at KE and the second at DR were caused by ruptured slugs. The Van Stone leak was at H Reactor. (5) Re-inspection of the "B" basin at 107-KE showed the inlet chutecross brace completely loose at one end, necessitating repair before the basin is returned to service. (6) A break in the raw water line supplying emergency water to B and C Reactors was discovered on May 15. Steam equipment was operated in the 183-B and C Pump Rooms to provide emergency back-up while the break was being repaired. (7) Investigation of ground settling at DR Reactor continued. The cause has not yet been determined.

There were no disabling injuries or formally investigated radiation incidents during May. One security violation was incurred.

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.

B-C REACTOR OPERATIONMAY, 1957I. Organization and Functions

No change.

II. Personnel

	APRIL 30			MAY 31			Net Change of
	<u>E</u>	<u>NE</u>	<u>TOTAL</u>	<u>E</u>	<u>NE</u>	<u>TOTAL</u>	<u>Total</u>
General	1	1	2	1	1	2	0
PA & PD Operation	3	2	5	3	2	5	0
B Processing Oper.	9	35	44	9	35	44	0
C Processing Oper.	8	31	39	8	32	40	/1
Power Operation	14	103	117	13	105	118	/1
Rad. Mon. Operation	5	21	26	5	21	26	0
Maintenance Oper.	<u>22</u>	<u>114</u>	<u>136</u>	<u>22</u>	<u>113</u>	<u>135</u>	<u>-1</u>
Total	62	307	369	61	309	370	/1

F.L. Hughes, Supervisor-100 Power II, B-C Power Operation, was transferred to KE-KW Power Operation as Analyst, Power Operation, effective May 15, 1957.

Nonexempt changes included two reactivations, four transfers in, two transfers out, and two optional retirements.

III. Personnel Activities

P.E. Whiteside, B-C Power Operation, and J.V. Clatworthy, B-C Maintenance Operation, attended a luncheon at the Desert Inn on May 10, for employees with 25 or more years of service with G.E., or combined G.E.-DuPont service.

An information-dinner meeting was held at the Desert Inn on May 28 for exempt personnel of the B C Reactor Operation. A.R. Maguire, B-C Reactor Operation Manager, reviewed the Reactor Operation performance for the fiscal year to date and L.V. Barker, Manager, B-C Radiation Monitoring Operation, gave an eyewitness account of the atomic weapons tests conducted at the Pacific Proving Grounds in 1956. Forty-four people attended the function.

Five Manager Development training meetings were held during the month with 48 people attending.

All B-C Reactor Operation Level 3 and Level 4 Managers completed the Professional Business Management-I Course this month.

IV. Safety and Security

There were nine Medical Treatment and no Disabling Injuries reported during May. Two Serious Accidents occurred, one of which resulted in a Medical Treatment Injury. No security violations were incurred.

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V. Non-Routine Reports

No significant non-routine reports were issued.

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.

VII. Component Activities

B-C ADMINISTRATION AND PERSONNEL DEVELOPMENT OPERATION

A. Administration Activities

Commission approval was received for all Top Secret Clearances and Document Repositories requested for the B-C Reactor Operation.

IPD functional charts for B-C Reactor Operation components were revised to proposed July 1 status as to personnel numbers and functions of components.

B. Personnel Development

The third five-week series of classes in Manager Development ("What is Expected of a Supervisor", by R.G. Clough) was concluded this month and the fourth series ("Communications", by Gene Murphy) was started.

D.K. Warner, IPD Measurements Specialist, and G.S. Spencer, B-C Reactor Operation Measurements Specialist, conducted a measurements program information meeting for all PA & PD Managers and their Measurements Specialists.

An article covering "Responsibility and Delegation" was issued for the B-C Manager Development Source Book.

C. Landlord Activities

A Man-hour study of current janitorial services to buildings was made to determine the need for revising the distribution of charges for such services. A power steam (by percentage to buildings) is also being made for the same purpose.

B PROCESSING OPERATION

A. Production

Input production (Pu) for May was 91.3 percent of forecast as a result of extensive outage time experienced due to a tube replacement outage (which included tubes originally scheduled for replacement last month) and the occurrence of three ruptures. The operating level was limited by reactivity losses in the fringe zones (due to discharge) and heat control problems.

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

There were nine unscheduled and one schedule outages as follows:

<u>Date</u>	<u>Cause</u>	<u>Outage Hours</u>
5-4-57	Charge-discharge, Tube removal	159.6
5-11-57	Unexplained Panellit scram, Row 26	1.1
5-11-57	Rupture in tube 1969-B (E-N)	17.9
5-13-57	Remove PCCF machine from tube 3681-B	.9
5-15-57	190-B Under-Current Relay Trip	.3
5-15-57	Rupture 2466-B	34.8
5-17-57	Rupture 2164-B (E-N)	25.0
5-18-57	Panellit scram (Faulty Toggle Valve)	2.2
5-20-57	Panellit scram (Broken panellit jumper)	.4
5-22-57	Panellit scram (Unexplained)	.2
Total Outage Hours		242.4

The reactor was shut down at 3:10 a.m. on May 13, 1957, to remove the PCCF charging machine from the nozzle of tube No. 3681, where it had become stuck during routine poison adjustments during operation. Operation was resumed at 4:05 a.m. on May 13, 1957, after .9 hours down.

2. Equipment Experience

Two PCCF tubes 1181-B and 2781-B, developed leaks due to wear from chattering dummies. Tube 1181 was removed and not replaced, and tube 2781 was temporarily blanked off. The remaining PCCF tubes were placed on reduced flow pending further investigation and correction of the problem.

Eighty-eight thin-walled process tubes and one problem tube were replaced during the month. Of a total of 41 tubes probologged, 26 were below minimum wall thickness limits.

3. Other

The ball 3X impulse lines from the riser bases to the mercoids were inspected and tested at 900 pounds, and the nipples on the far riser base were re-welded to provide a firmer base.

C. Improvement Experience**1. Production and Process Tests**

PT-IP-2A, "Special E-N Loading", was in effect at the start of the month, but was discontinued due to the rupture rate experienced. All tubes on this production test were discharged.

PT-IP-A-84MT, "Evaluation of Uniform Corrosion Resistance of M-388 Aluminum Slug Jackets", was initiated in May with ten tubes charged.

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2. Projects

Active projects at B Reactor were: CG-558, "Reactor Plant Modifications for Increased Production"; CG-666, "Zone Temperature Monitor"; CG-669, "Water and Gas Leak Detection"; CG-665, "Metal Loading Elevator"; CG-667, "Space Utilization"; CG-583, "Moisture Monitor For Leaking Process Tubes"; and CG-684, "Fresh Air System".

D. Events Influencing Costs

1. A total of five exempt and 304.8 nonexempt overtime hours were required at B Reactor in May.
2. Gas Usage - Gas consumption continued to be high. During the first 14 days, approximately 115,000 cubic feet total were used. An increase in usage rate was noted at mid-month with approximately 279,000 cubic feet being used in the period from May 14 through May 28.

C PROCESSING OPERATION

A. Production

The C Reactor input production (Pu) for May was 129.8 percent of the forecast. The operating control point was tube power (average 10 hottest tubes) throughout May. Production was higher than forecast as a result of no unscheduled outages and only one scheduled outage.

A new production record for C Reactor was achieved during May. The new record exceeded the previous high (June 1956) by 4,264 units.

B. Operating Experiences

1. Operating Continuity

One (scheduled) outage of 40 hours duration was experienced during the month.

2. Equipment Experience

a. Condensate Collection

A total of 449 gallons of condensate was collected over a seven-day period following the reactor startup of 4-30-57. The abnormal condensate was due to residual moisture remaining in the graphite from a leaking process tube (rupture 1664) that was replaced on the April 28 outage.

b. Rear Nozzle Connectors

The rear nozzle elbow connectors on tubes 2185 and 1880 failed during operation as a result of their being run as water tubes after two successful quickie discharges on April 30, 1957. The rear nozzle connectors were replaced on the May 20 outage and the tubes were recharged with regular production material.

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C. Improvement Experiences

1. Production Tests

PT-634-A - In-Pile Cocked Slug Test - Two tubes charged in accordance with this production test were discharged in May. This completed the production test.

PT-IP-19-A - Pilot Charging of I & E Fuel Elements - C Reactor - Sixty-five tubes were charged with I & E slugs and 33 charges of I & E slugs were discharged during the month, bringing the total number of I & E charges in the reactor to 316 at month's end.

2. Projects

Continuous Charge-Discharge C File Demonstration Unit - CG-651 - The installation of electrical wiring and the vertical gamma monitoring system continued throughout the month.

100-C Alterations - CG-600 - Preparatory work for the installation of the 66-inch line between the diversion box and the 107-C east basin was started during May.

D. Events Influencing Cost

1. Overtime

A total of 238 manhours overtime was required during the month.

B-C POWER OPERATION

A. Operating Experience

The river elevation varied between 390.8 and 407.1 feet while turbidity ranged between 21 and 191 PPM during the month.

A break in the raw water line, supplying emergency water to 105-B and 105-C, was discovered on May 15, 1957 at 8:00 a.m. Raw water pressure was restored to the Groves valves at 105-B and 105-C at 6:10 a.m., May 16, 1957. Supplemental Process Standards were issued to allow reactor operation while the repair was being completed. Steam equipment was operated in both 183-B and 183-C Pump Rooms as emergency back up during the raw water line outage.

On May 15, 1957, No. 6 synchronous motor was being tested for magnetic center with the pump uncoupled. When Power Loss Relays were restored to normal, the 67 CFW under-power relay tripped, causing a scram at 105-B.

B. Equipment Experience

181-B Building - The No. 12 B pump was out of service all month for correction of a vibration problem.

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183-B Building - The impeller on No. 6 process pump was inspected on May 27, 1957 to determine the effectiveness of Epoxy Resin applied to cavitation pits on April 24, 1957. Results were better than that obtained with the resin applied on March 21, 1957. Some pitting was observed around the margins and in the central area of the patch. In the previous test most of the resin had disappeared after one month's use. All pits on one side of the impeller were filled with various types of Epoxy Resins, the other side treated with several types of organic polymers, and the unit returned to service on May 29, 1957.

190-B Annex - A flow test on six-pump operation was completed on May 6, 1957. Resultant pressure and flow indicated six pump operation is feasible.

A new stator was installed on No. 6-A motor to replace the stator that shorted out on April 26, 1957. While No. 6-A unit was out of service the impeller was repaired and modified.

No. 8-A pumping unit was removed from service on May 21, 1957 for repair and modification of the impeller.

190-C Building - The fluid drive on No. 8 process pumping unit was inspected on May 21, 1957. The stabilizing ring in the impeller had broken loose from the vanes and slight cracks were visible on the vanes near the hub. The fluid drive assembly was shipped to the American Blower Company on May 28 for replacement and impeller design changes.

C. Improvement Experiences

1. Projects

CG-558 - Work continued through the month on bypass piping changes. Modification was completed on units No. 3-A, 6-A, 8-A, and partially completed on units No. 2-A and 7-A.

Contract forces started work (May 27, 1957) on blacktopping roads and parking areas damaged during CG-558 construction.

CA-649 - FY 1956 Water Tank Replacement - The project was completed in 100-B Area except for painting lines in the Power House.

D. Events Influencing Costs

1. Chemical costs for treating water were high due to river rise and the resultant increase in turbidity.
2. Maintenance costs were high due to extensive Productive Maintenance and the damaged fluid drive on No. 8 process pump in 190-C.
3. The total overtime worked for B-C Power Operation for May was 102 hours.

B-C RADIATION MONITORING OPERATION

A. Radiation Occurrences

A dose of 636 mr was reported on the 100-B area badge film of J.A. Bee, W-5268-5950, KE-KW Radiation Monitoring Operation, for the period April 26 to May 9. No reasonable explanation for this dose could be found. A formal investigation was held and the incident will be reported in document HW-50386, IPD Investigation Report #116-R, Radiation Overexposure.

An operator was found to have a particle on his sock giving a dose rate of 60 mrads/hr, upon leaving the 105-B discharge area. Film surveys of the particle indicated that the maximum dose received was not over 270 mrads.

There were no other lapses of radiation control during the month.

B. External Exposure Control

A ruptured fuel element was removed from the B Reactor at a maximum personnel dose rate of 1 r/hr. The maximum dose rate of 1.5 rads/hr was received during decontamination of quickie discharge equipment at 105-B.

Personnel dose rates up to 2 r/hr were encountered during the removal of gun barrels from the 105-C discharge area. A maximum personnel dose rate of 1.6 rads/hr was experienced while taking samples in the water sample rooms; the high dose rates were caused by contaminated drain troughs. Personnel dose rates up to 1 r/hr were encountered during attempts to locate an irradiated slug while draining a metal examination basin.

Radiation levels in the discharge areas continued to be high for several hours following shutdown. A maximum dose rate of 1 r/hr at the elevator railing has been measured immediately after shutdown in the C Reactor.

C. Contamination Experience

Several radioactive particles, reading a maximum of 20,000 c/m, were found in the main gatehouse during the month. The source of these particles was apparently the spread of contamination from the 105-C retention basin which occurred in April. Extensive surveys of personnel revealed no detectable contamination and surveys of all buildings outside the exclusion areas revealed no spread of contamination in these locations.

A leak in the seal in the control rod cooling water system caused the 105-C outer rod room to become contaminated with effluent water vapors. The maximum dose rate at the leak was 250 mrads/hr.

There were eight cases of skin contamination reported; the maximum level was 7,000 c/m and in all cases the contamination was easily removed.

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Seven of the fifty-one vehicles surveyed during the month were found to be contaminated. The maximum level was 10 mrads/hr on the 105-C Processing pickup.

A total of 153 air samples was taken during the month and none indicated activity densities above the permissible limits for the respiratory protection worn.

D. Events Influencing Costs

Overtime Usage

A total of 420 hours overtime was worked by Radiation Monitoring personnel in 100-B Area in May.

B-C MAINTENANCE OPERATION

A. Equipment Experience

1. Instruments

Temperature Monitor Systems - Nine thermocouples required repair at B Reactor, and six were replaced with spares at C Reactor during the month.

Safety Circuit - 105-B - All Beckman high voltage and signal leads were replaced from the control room down to the minus 9 level. The "type 80" rectifier tubes were replaced with the more reliable "type 5R4" tubes.

2. Electrical

Control Panel Modifications - 105-B - Extensive modifications to the 105-B control panel were made during the 5-4-57 outage. These modifications included: replacing three old annunciators with a new forty-eight drop annunciator, relocation of the deviation recorder to improve operational visibility, relocation of clock and miscellaneous indicating lights, and relocation of communication controls.

Battery Supply Voltage Change - 190-B - Direct current battery-supplied voltage in 190-B was changed from 130 volts to 120 volts by removal of four cells from the system. This change eliminated the tendency of overheating of the D.C. relays.

3. Mechanical

Tube Removal - 105-B - During the scheduled outage of 5-4-57, 88 tubes were removed and replaced at a rate of 1.04 tubes per hour.

Third-Party Pressure Vessel Inspection - J.A. Cronin, Traveler's Insurance Company, inspected seven air receivers in the area and the helium and carbon dioxide vessels at the 110-B Area. All vessels were satisfactory except three air receivers that require internal painting.

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B. Shift Maintenance Activities

Shift Maintenance personnel were active in tube removal and rupture removal outages during the month. Home area work was largely devoted to scheduled PM overhauls.

C. Maintenance Engineering and Planning & Scheduling

1. Instrument Engineering

C Reactor Sewage Lift Station - Because of a recent incident in which the sewage lift station failed to operate properly, resulting in large areas of flooding and contamination, a study of the pump control and water level alarm system was initiated. As a result, recommendations were issued to utilize dip tube bubblers for level control and alarm, in place of the present limit switches, floats, and mechanical linkages, to increase the reliability of the system.

Reactor Gas Instrumentation Study - Proposals for necessary interim modifications to the B Reactor gas flow and pressure instrumentation were completed and issued. All other required system modifications were incorporated into the scope of Project CG-706, "Installation of Improved Reactor Gas Instrumentation".

B Reactor Seismoscope Relay Assembly - A short-circuit in a selenium rectifier in one of the seismoscope relay units burned out the transformer. Plans are being made to alter the system circuitry to include a current limiting resistor between the rectifier and the first 50 mf condenser to limit the initial inrush of current when the condensers are not charged. Also, consideration is being given to the use of silicone diodes in place of the selenium rectifiers because of the high ambient temperatures encountered.

Graphite Thermocouple Stringers - B Reactor - Of the two stringers installed in B Reactor during the last 12 months, only two of the ten chromel-alumel couples are still operable whereas eight of the ten iron-constantan couples are still in service. In one of these stringers, which contained five Cr/Al and five I/C thermocouples, two of the Cr/Al couples failed during the first month of operation, one failed the second month, and after six months of operation only one of the five was in operable condition. Because of the high cost of these stringers (about \$1500 each), an investigation is being made in conjunction with the Materials Development Operation to find a thermocouple wire of considerably longer life.

2. Mechanical Engineering

Work Area Catwalk - 105-C - Designs were prepared and issued for the installation of a catwalk in the 105-C work area to provide safe access to several junction boxes for the installation of CG-651 equipment as well as for trouble-shooting and servicing C Elevator trail cables and hoses. This is to eliminate the potential safety hazard associated with the use of temporary scaffolding for this purpose.

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Gamma Monitor Chamber Modifications - Design Change Number 170-C was approved and issued for the removal of the enlarged portion of the rear nozzle insert to alleviate the cap sticking problem caused by corrosion product buildup in the small annulus between the insert and the nozzle.

3. Electrical Engineering

Design Change Number 168-B, Ball 3X Sensing Line Revision - As a result of a recent ball drop at D Reactor, which was caused by a sensing line failure, Design Change Number 168-B was issued to provide two new sensing lines from the risers to the Ball 3X pressure switches to prevent system actuation as a result of a single sensing line failure. The design change also requires replacement of all soft solder connections in existing sensing lines with silver brazed connections to comply with ASA code.

4. Planning and Scheduling

a. Productive Maintenance

Shortage of manpower continued to hinder completion of scheduled Productive Maintenance work this month. A total of 6,348 man-hours of Productive Maintenance was scheduled during May. This was divided between 198 Class A overhauls, 221 Class B overhauls and inspections, 14 Class C, and 11 lubrications. Of this total, 40 percent was completed.

b. Property Accountability

Major activity related to property accountability this month was devoted to removal of obsolete equipment from the area. Large quantities of material were sent in as excess, scrap, or salvage. A total of 1,148 items were excessed having an approximate value of \$38,000.

D. Events Influencing Costs

Overtime Usage

A total of 385 hours of overtime was worked by B-C Maintenance Operation this month for B-C Operation work.

Labor Costs

Due to a slackening of tube removal work, B-C Maintenance Operation shift personnel were in their home area a greater percentage of the time this month, than during the past three months. This caused a slight increase in labor costs to B-C Operation.

A. R. Maguire

Manager
B-C REACTOR OPERATION

D-DR REACTOR OPERATION
MAY, 1957

I. ORGANIZATION AND FUNCTIONS

Organization and assigned functions of the D-DR Reactor Operation remained unchanged during the month.

II. PERSONNEL

A. Force Report

	<u>April 30</u>			<u>May 31</u>			<u>Net Change</u>
	<u>NE</u>	<u>E</u>	<u>Total</u>	<u>NE</u>	<u>E</u>	<u>Total</u>	
D-DR General	1	1	2	1	1	2	0
D-DR Admin. & Pers.							
Development	2	3	5	0	3	3	-2
D Processing	36	9	45	36	8	44	-1
DR Processing	30	8	38	30	9	39	+1
D-DR Power	109	14	123	110	14	124	+1
D-DR Rad. Mon.	21	5	26	21	5	26	0
D-DR Maintenance	<u>135</u>	<u>22</u>	<u>157</u>	<u>137</u>	<u>22</u>	<u>159</u>	<u>+2</u>
Totals	334	62	396	335	62	397	+1

B. Exempt Personnel Movement

1. R. C. Christianson, D Processing Operation, replaced R. E. Dunn as Specialist, Measurements and Administrative Procedures, effective May 1. On the same date Mr. Dunn transferred to the DR Processing Operation as Supervisor, 100 Operations I.
2. L. F. Hannan transferred from Facilities Engineering Operation to D-DR Reactor Operation as Supervisor, Radiation Monitoring I, effective May 15.
3. S. C. Nelson transferred from Supervisor, Radiation Monitoring I, with D-DR Reactor Operation to ANP at Arco, Idaho effective May 6.

C. Nonexempt Personnel Movement

Nonexempt personnel changes during May included one deactivation, five transfers into and three transfers out of the D-DR Reactor Operation.

III. PERSONNEL ACTIVITIES

- A. Dr. J. C. Conant, Industrial Psychologist, completed a series of eight meetings for seven D-DR Reactor Operation employees on the subject of Human Relations.

Twenty-two members of D-DR Reactor Operation attended a meeting in which E. W. Baker, Plant and Industrial Engineering Operation, reviewed the IPD Productive Maintenance Program.

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- B. L. F. Hannan attended a meeting, given by W. E. Johnson, honoring employees having 25 years of combined Du Pont and General Electric service.

IV. SAFETY AND SECURITY

- A. There were 23 medical treatment injuries and no disabling injuries during May.
- B. A near-serious accident occurred at D Reactor on April 30 during charge-discharge. Because of incomplete reassembly after the CG-558 outage, the near charge machine fell to the floor of the C Elevator narrowly missing a man's leg.
- C. No security violations were incurred during the month.

V. NONROUTINE REPORTS

A special incident report, "Impulse Line Failure - Ball 3X System - D Reactor" was issued by E. W. O'Rourke on May 17, 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 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

A. D-DR Administration and Personnel Development

1. Administration

Classes for IPD Personnel assigned to rescue crews began on May 10. Sixteen D-DR Reactor Operation employees, including six new participants are scheduled to attend.

2. Personnel Development

The Supervisory Selection Program was reviewed in order to bring D-DR Reactor Operation lists of candidates up to date.

Two Technical Graduates were on rotational assignment with the D-DR Reactor Operation throughout the month.

3. Cost Control Activities

Budgeted overtime for the month was 1777 hours; actual overtime worked in support of D-DR Reactor Operation during May was 4498 hours or 7.09 percent of the available manhours. This was primarily due to the unanticipated demands of the ball drop outage at D Reactor.

4. Landlord Activities

A review of the rent and cost picture for FY-1958 space occupancy was completed. Budgeted costs for landlord charges to all using components is up approximately 10 percent from FY-1957. Projected rental income, based on current rates, is expected to be up 35 percent, and thus indicates the probable need for an adjustment in rental charges.

The first meeting of a committee formed to study the problems associated with women's facilities in the Area, was held during the month. Recommendations for immediate improvement are being acted upon. A review of long range objectives was also made.

Exterior painting, scheduled for August in 100-D Area, was rescheduled to June. Work requests for approximately 1200 man-hours of painting of landlord facilities have been issued.

B. D Processing Operation1. Production

Input production was 77.0 percent of the official forecast, and time operated efficiency was 63.8 percent. Forecasted production was not met because of a nine day outage caused by a 3X Ball drop. Loss of reactivity, due the 3X Balls lodging in moderator fissures limited level following start-up after the ball drop.

2. Operating Experiencea. Operating Continuity

<u>Outage Date</u>	<u>Outage Hours</u>	<u>Cause</u>
5-1-57	13.5	Scheduled charge-discharge.
5-5-57	225.4	3X Ball recovery
5-16-57	.7	Quickie discharge of Tube 4082-D.
5-30-57	29.6 (May)	Scheduled charge-discharge.
	62.7 (Total)	

b. Equipment Experience

A 3X Ball drop occurred on May 5, during equilibrium operation. Failure of a sweated joint in the impulse line from the far supply riser to water pressure switches of the Ball 3X System caused the drop. Removal was prolonged when graphite fragments were encountered in nine of the twenty-eight channels of balls.

During the May 30 outage, Design Change 168, "Ball 3X Safety Circuit Sensing Line Revision," was accomplished. This included the replacement of the existing impulse lines, with lead sweated joints, with new lines using pressure fittings, and the addition of one more line to provide separate pressure impulses to dual Ball 3X electrical circuits.

New .236" orifices were installed in the Poison Column Control Facility (PCCF) nozzle assemblies during the May 30 outage.

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b. Equipment Experience (Continued)

This was done to reduce the tube flow and thus eliminate the possibility of damage to the tube caused by metal chatter.

Repair of several gas leaks around the front face thermal loop bellows and one rear face tube bellows have reduced the gas consumption rate by one-half. Intermittent high air content in the reactor gas remains a problem.

3. Improvement Experience

a. Production and Process Tests

Under IP-12-AE, "Poison Spline Flexible Control System, Supplement C" twenty-two additional spline caps were installed on D Reactor tubes during the May 30 outage, for a total of 34 such caps installed to date.

4. Events Influencing Costs

The nine-day ball removal outage resulted in heavy manpower expenditures by Maintenance, Processing and Radiation Monitoring Operations. A total of 828.4 hours overtime were used by D Processing during the ball removal outage.

C. DR Processing Operation

1. Production

Input production was 92.2 percent of official forecast. Time operated efficiency was 78.0 percent. Operation was interrupted by one scheduled outage, six scrams and four unscheduled outages. The above normal number of unscheduled outages prevented attainment of official forecast figures.

2. Operating Experience

a. Operating Continuity

<u>Outage Date</u>	<u>Outage Hours</u>	<u>Cause</u>
5-2-57	.2	Panellit scram. Cause unknown.
5-3-57	.7	Panellit scram. Low trip caused by leaking tube 0782-DR.
5-3-57	33.7	Water leak and ruptured slug in tube 0782-DR.
5-5-57	.7	Panellit scram. Cause unknown.
5-6-57	21.6	Stuck ruptured slug in tube 1273-DR.
5-12-57	35.0	Water leak in tube 2185-DR.
5-17-57	.3	Panellit scram from trip on row 46.
5-27-57	51.0	Cause unknown. Scheduled outage for charge-discharge.

a. Operating Continuity (Continued)

<u>Outage Date</u>	<u>Outage Hours</u>	<u>Cause</u>
5-30-57	.3	Panellit scram from trip on row 12. Cause Unknown.
5-31-57	.3	Panellit scram due to high trip on tube 1783-DR due to ruptured slug.
5-31-57	20.0	Stuck ruptured slug in tube 1783-DR.

b. Equipment Experience

On May 3 a combined rupture and water leak occurred in tube 0782. Following removal of the leaking tube, the reactor didn't dry out and a second shutdown occurred on May 12. This leak was isolated in a ruptured PCCF tube. After removal, water collection gradually decreased to normal at month end. A total of 4,380 gallons of water were removed from the reactor during the month. On examination the PCCF tube was found to have been punctured by chattering of the lead-cadmium pieces with which it was loaded. All other PCCF tubes were probologged and returned to service. To eliminate this problem for the future, .236" orifices were installed in the front assemblies of all PCCF tubes. This is expected to reduce the tube flow to a safe value.

Investigation was continued in connection with the settlement of Building 105-DR. Excavation was begun on the far side of the building around the far effluent line anchor block. Flow was diverted to the far downcomer during the shutdown of May 27. After the flow had been in this downcomer approximately 30 minutes, it was noted that water was flowing into the excavated pit from between the effluent line and the anchor block. The source of this leak is still to be determined. A void was found under the floor of the near gas tunnel after a 6-inch hole was drilled there.

No. 2 HCR hose reel again bound during reactor start-up on May 3. Following adjustment of the packing, it worked satisfactorily.

This month's four unexplained Panellit scrams are suspected to have been caused by a random, very wide gage fluctuation. Consideration is being given to replacement of a portion of the Panellit gages with ones having a 10 - 90 psi range, in order to correct this problem.

3. Improvement Experiencea. Production and Process Tests

Six tubes were charged under FT-IF-56-A, "Low Hydrogen Dingot Material".

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a. Production and Process Tests (Continued)

A thimble was installed in D test hole as authorized by PT-IP-14-AC, "Shield Temperature Control" so that foils may be used to measure far side reactor flux.

One tube was charged under PT-IP-67-D, "Irradiation of Zirconium-Uranium Alloy Test Specimens".

One tube was charged under PT-105-534-SI, "Irradiation of NAA File Safety Device".

PT-IP-62-C, "Determination of the Reactivity Effect of Metal Temperature in an Operating Reactor", was conducted just prior to the outage of May 27.

Project CG-684, "Adequate Fresh Air Facilities - 105-DR" was completed during the month.

Under Design Change 168, dual sensing lines were installed from the riser to the pressure sensing switches for the Ball 3X System.

Metal Discharge - Two time study and performance tests were run -- one using crossheader pressure and the other purge pump pressure through stingers to discharge process tubes. By discharging tubes in this fashion and recapping them, it may be possible to schedule discharge area maintenance work while the front face crew is charging the tubes. Thus, a large amount of reactor down time can be saved. Further tests are planned and the results will be reported under separate cover.

4. Events Influencing Costs

Overtime and maintenance costs were expected to be higher than normal due to the several unscheduled outages which occurred during the month. The overtime rate for May was 3.9 percent of the available number of hours.

Gas costs were high because of abnormal leakage which has not been isolated.

D. D-DR Power Operation

1. Operating Experience

Critical power conditions grade "S" existed in D and DR Areas on May 6 and grade "W" on May 7.

The export pumping load was supplied by 100-B Area during the month except for two separate occasions when it was carried by 100-D for periods of 10 and 46 hours during necessary maintenance work at 100-B Area.

1. Operating Experience (Continued)

Electrical power surges which were noted on May 2 were caused by lightning east of Midway substation. Operating equipment was not affected.

A surge occurred on the export system on May 7, due to opening of the Groves valve in 100-B Area.

Boiler operation was satisfactory during May, with an average steam load of 92,400 lbs/hr, and a maximum load of 114,000 lbs/hr. The average evaporation rate was 6.35 lbs. of steam per pound of coal, with an average efficiency of 64.5 percent.

2. Equipment Experience

Sandblasting and painting of the boiler breechings at Building 184-D was begun on May 21. Sandblasting and first coat has been completed on Number 1 and Number 2 breeching.

Modification and repairs of the primary impeller wearing rings and suction vanes were completed to Nos. 2, 3 and 4 process pump units at Building 190-DR during the month. On May 24, No. 6 process pump unit was removed from service for similar repairs late in the month. This will complete process pump modification.

3. Events Influencing Costs

Significant items affecting Power Operation costs included:

- a. Extensive maintenance on the ash sluice line and the Area fire and sanitary facilities.
- b. A large amount of Productive Maintenance scheduled during the month.

E. D-DR Radiation Monitoring Operation

1. Radiation Occurrences

Two lapses of radiation control occurred during May:

- a. Contamination up to 85 mrad/hr at surface was found on the concrete walkway under the duct work of the decontamination cooker at the DR wash pad. This area is normally not a radiation zone.
- b. Several metal and dummy boxes were found stored in Building 1713-DR. A maximum dose rate of 230 mrad/hr was found on the boxes.

In view of the scope of the work performed, it is considered noteworthy that no radiation occurrences were reported during the month's heavy outage schedule.

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2. External Exposure

A relatively large amount of exposure was received during Ball 3X recovery operation at D Reactor. Representative dose rates for various phases of the work were as follows:

- a. Disconnecting ball collector hose - 300 mr/hr
- b. Changing filters of 3X vacuum system - 20 to 100 mr/hr
- c. Handling pipe in channels - 200 mr/hr at one and one-half feet
- d. Handling vacuum hoses - 600 mr/hr at two feet
- e. Disconnecting ball storage drums from chute - 1 r/hr at 1 foot

Dose rates in both reactor discharge areas, immediately after shutdown, were up to 1,000 mr/hr in front of tube caps during the first half of the month. By month end, comparable dose rates were 500 to 700 mr/hr.

3. Contamination Experience

Effluent vapors backed up in a line from Building 1608-D to the D Reactor transfer area. The open end of the pipe gave a maximum dose rate of 250 mrad/hr.

4. Events Influencing Costs

About 1200 hours of monitoring overtime were used during the month. The majority of this overtime was used during the D Reactor Ball 3X recovery work.

F. D-DR Maintenance Operation

1. Equipment Experience

a. Instruments

<u>Panellit Data</u>	<u>105-D</u>	<u>105-DR</u>
Base checks	1 (All)	All plus 87
Gages Adjusted during Operation	707	515
Gages Replaced		
Defective Switches	0	0
Capillary Tube Failure	2	2
Other		Dial drum drive arm Disengaged - 6
Impulse Lines		
Response Checks	0	2
Sluggish Lines Corrected	0	2

a. Instruments (Continued)

Temperature Monitor System

Twenty-five process tube thermocouples were repaired at D Reactor.

File Control Instrumentation

At the DR Reactor, supply cables from the subcritical proportional counter chamber, located in E test hole, failed after 60 days operation due to overheating. Relocation of the start-up bucking voltage chamber, also located in E test hole, permitted withdrawal of the subcritical chamber three feet and relieved the overheating.

b. Electrical

All VSR clutches were checked and adjusted at D Reactor during the month. Several new clutches were ordered to be used for replacements so that existing clutches may be removed for use in slippage problem studies.

c. Mechanical

Material Handling included:

Chlorine	30 drums (full)	30 drums (empty)
Oil	10 drums	
Casks	40	
Drums	399	
Carloads	2	

2. Maintenance Shift Activities

The shift crews spent 86 percent of their time in 100-D Area and 14 percent of their time in 100-H Area.

3. Maintenance Engineering and Planning and Scheduling

a. Maintenance Engineering

(1) Instrument and Electrical Engineering

Assistance was provided in leak testing Building 115-D. Results indicated that the building was contributing one-third of the total gas loss which has been considerably above normal since Project CG-558 start-up.

A design change which will provide for bypassing of the 105 No. 1 Safety Circuit and the 190 emergency steam turbine trips for individual instead of groups of 4500 HP pumps, is being prepared and is 50 percent complete.

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(2) Mechanical Engineering

The award to fabricate four (4) stainless steel tanks and two (2) drain pans and exhaust hoods for new dummy decontamination facilities at both reactors, was given to Construction Operation Forces with delivery expected in June.

Final design of a high pressure hydraulic back-up for operation of the PCCF ball valves has been completed. Pressure for the new system is supplied by the accumulator pumps. Installation is complete in Building 105-DR.

b. Planning and Scheduling

During the month, a new scheduling system was implemented for all Mechanical Supervisors, including the shift crews, and the Transportation Supervisor. This system, basically, involves preparing for each supervisor, a detailed daily listing of work to be performed the following day.

Fifty-two Productive Maintenance cards were sent to the field during the month of May. From the standpoint of manhours, approximately 85 percent of the scheduled Productive Maintenance work for May was completed. PM work accounted for approximately 10 percent of total maintenance manhours.

Pat Cabell and his Industrial Engineering Operation started a work sampling program on May 29.

4. Events Influencing Costs

The D-DR Maintenance Operation overtime usage was 2560 hours, or 8.05 percent of the available manhours during the month of May.

EW O'Rourke

Manager,
D & DR Reactor Operation

EW O'Rourke:WLS:af

F REACTOR OPERATION
MAY - 1957

I. ORGANIZATION AND FUNCTIONS

Operating responsibility for equipment installed under Project CG-558 was assumed by F Reactor Operation after the completion of Acceptance Tests.

II. PERSONNEL

A. Force Report

	<u>April 30</u>			<u>May 31</u>			<u>Net Change</u>
	<u>NE</u>	<u>E</u>	<u>Total</u>	<u>NE</u>	<u>E</u>	<u>Total</u>	<u>of Total</u>
General:	1	1	2	1	1	2	0
A. & P. D. Operation:	1	3	4	1	3	4	0
Processing Operation:	35	8	43	35	8	43	0
Power Operation:	66	8	74	68	8	76	+2
Radiation Monitoring Operation:	11	4	15	10	4	14	-1
Maintenance Operation:	<u>93</u>	<u>16</u>	<u>109</u>	<u>93</u>	<u>17</u>	<u>110</u>	<u>+1</u>
	207	40	247	208	41	249	+2

B. Movement of People

K. J. Parchen, Supervisor - Maintenance II, transferred from Community Operation to F Maintenance Operation, effective May 15.

III. PERSONNEL ACTIVITIES

The Level III and Level IV Managers completed the twenty-week course on Professional Business Management I.

Twenty-five F Reactor personnel participated in two Conference Table Meetings, conducted by C. N. Gross.

A series of information meetings on contamination control of Columbia River water was conducted by W. G. Howell - F Radiation Monitoring Operation.

In addition, fourteen employees attended various other information meetings and sixteen employees were in attendance at other training meetings conducted by personnel from other components.

IV. SAFETY AND SECURITY

There were no disabling injuries. Fifteen medical treatment cases and one security violation were reported during the month.

V. NONROUTINE REPORTS ISSUED

None.

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VI. INVENTIONS AND DISCOVERIES

All persons engaged in work that might reasonably be expected to result in inventions or discoveries advise that, to the best of their knowledge and belief, no inventions or discoveries were made in the course of their work during the period covered by this report. Such persons 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 AND PERSONNEL DEVELOPMENT OPERATION

A. Administration Activities

Top Secret clearance requirements were submitted to Security and Patrol Operation to conform with new security regulations.

Six I.P.D. Advices and one O.P.G. were reviewed and comments submitted to the issuer.

Personnel and functional listings for F Reactor Operation were submitted to the Telephone and Radio Operation for inclusion in the August issue of the Plant Telephone Directory.

B. Personnel Development

The second series of information meetings primarily for F Reactor exempt personnel was completed, with 42 people attending meetings conducted by J. C. Conant on Human Motivations.

Schedules and arrangements were completed for F Reactor Operation personnel to participate in the following programs: (1) Rescue Crew Training Course; (2) security information on Confidentially Yours; (3) plant tour for women employees.

See Item III above (Personnel Activities).

C. Cost Control Activities

E. C. Bennett presented information to the Level IV Managers on budgeting procedures and the current status of HAPO - IPD and F Reactor budgets for FY 1958 and 1959.

D. Landlord Activities

Painting of building exteriors continued throughout the month. This program is approximately 75 percent complete.

Modifications and improvements were completed on the air conditioning systems for the 1700-F series buildings.

D. Landlord Activities (Continued)

Lunch and locker room facilities for F Maintenance Operation were consolidated in the 1707-F and 1717-F Buildings, thus making the 1707-A-F Building available to Facilities Engineering Operation for conversion to office space.

The initial spraying of the area with 2,4-D chemical for weed control was approximately 70 percent completed at month's end.

Following major completion of the CG-558 Project, the general area was inspected and a punch list supplied Construction forces for final area cleanup.

F PROCESSING OPERATION**A. Production**

Reactor input production was 141 percent of forecast. The forecasts were exceeded because the CG-558 outage was concluded approximately two days ahead of schedule. Power levels during the short operating period were restricted by tube power limitations. The CG-558 improvements permitted an increase in maximum level of 180 units.

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

<u>Outage Date</u>	<u>Outage Hours</u>	<u>Reason</u>
5-1-57	423.8 (in May)	The reactor was down at the end of April for CG-558 modifications.
5-18-57	1.7	Removal of sub-critical monitor equipment after first indication was reached.
5-18-57	6.0	Unexplained Panellit scram.
5-19-57	10.4	Poison discharge.
5-24-57	.5	Panellit scram caused by incorrect jumpering of a Panellit gage.
5-29-57	.4	Panellit scram caused by a broken jumper.
5-29-57	.3	Unexplained scram from Panellit ground detector.

Total 443.1

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B. Operating Experience (Continued)

2. Equipment Experience

Thermocouples - The replacement of all process tube thermocouples, which was started during April, was completed during May.

Graphite Stringers - Graphite stringers in channels 1073-F and 1266-F were replaced on May 14.

Reactivation of Problem Tubes - The 37 channels which had been cleared of problem tubes during April were retubed and charged during May. One additional problem tube channel (0394) was cleared, retubed, and charged during the month. There are seven problem tubes remaining in F Reactor.

Painting of Neoprene Seal - The application of a preservative coating on the top far and top rear Neoprene seals was completed on May 15.

Boot Replacements - Ten rear face boots were replaced with new seamless boots during the month.

Gamma Monitor - Replacement rotameter graduate tubes were installed in all gamma monitor sample lines during the month.

3. Other Activities

During the month, the F Processing Operation supplied assistance in the cleaning of the Ball 3X System balls recovered from the VSR channels in D Reactor. The 105-F ball washer was used for this purpose. Considerable amounts of maintenance work and cleanup work were required to restore the washer to normal status after the balls were processed.

C. Improvement Experience

1. Production and Process Tests

Process Test MR-105-31 - "Process Tube Sliding Seal" - The seals on tubes 2676, 2677, 2678, and 2680 were tightened and the tubes were pressure tested. All of the leaks found during March were corrected.

2. Projects

CG-666 - "Zone Temperature Monitor" - Resistance temperature detectors were installed on 211 zone temperature monitor pigtails during the month.

CG-684 - "Adequate Fresh Air Systems - 105 B, D, DR, F & H" - The rear face portion of this project was completed during the outage. This project is approximately 90 percent complete.

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

2. Projects (Continued)

Details on Project CG-558 work may be obtained from the Facilities Engineering Operation Monthly Report. Included below are the items of particular significance to the F Processing Operation.

Acceptance Tests at full flow were initiated on May 1 but were interrupted several times by difficulties with the 36-inch raw water line to 183-F and by a leak near the top of the downcomer. The Neoprene seal at the point where the rear crossover line joined the downcomer was found to have deteriorated so that water leaked out around the outside of the downcomer and flooded the cushion chamber and several rooms on the zero level in the 105 Building. A temporary seal was installed to permit completion of Acceptance Tests and a more permanent "Hypalon seal" was installed on May 17. At month end, this seal was also leaking, although not enough to interfere with operation. A reinforced moulded seal has been ordered and will be installed when available.

Tests on the Poison Column Control charging machine provided by the project indicated that several modifications were necessary. By month end, the machine had been used successfully for charging several tubes, but certain details of the equipment still required improvement to achieve satisfactory performance.

Shortly after operation was resumed, gas leaks were found on a number of the bellows on loop header pigtails to thermal loop tubes from which the augers had been removed as part of CG-558 work. Temporary repairs were made with rubber cement until new bellows can be obtained and installed.

The Acceptance Test on the 1904-F overflow flume was cancelled when agreement was reached that the flume would be modified with project funds. A baffle was installed to increase the height of the flume wall in the critical location. The modification was similar to one that was made at 1904-B.

Other Projects

Work was started during the month on Project CG-740 - "Replacement of Central Viewers - 105 D and F Buildings" and Project CG-665 - "Metal Loader for C Elevator".

Work continued on Project CG-667 - "Improved Space Utilization" and Project CG-583 - "Moisture Monitoring System for the Detection of Leaking Process Tubes".

3. Other Improvements

Improvements accomplished during the month are listed below.

- a. A condenser was installed on the downcomer vent pipe to

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3. Other Improvements (Continued)

reduce the amount of moisture in the exhaust system.

- b. The charging machine oil system was relocated from the work area to the C Elevator pit.
- c. Oil was added to the bourdon tubes on all Panellit gages to reduce gage fluctuations and reduce the possibilities of unnecessary scrams.

Revision of the Panellit gage trips to 10 psi and 90 psi above base continued during May so that by month end all fringe zone Panellit gages were equipped with gages with the wide trip span.

- d. A sight glass was installed on the rear face relief riser to permit better control of the water level during reactor leak testing.
- e. A new valve body was installed on the HCR water PRV. The new system will provide better regulation of the pressure and reduce the noise level in the rod room.
- f. The new continuous air monitor, which was installed during April, was utilized during the month to permit rapid determinations of protective clothing requirements on the rear face. This enabled some work to be accomplished more efficiently because the percentage of rear face time when masks were required was decreased.
- g. The proportional counter start-up instrumentation has been improved by the installation of individual pre-amplifiers for each chamber and by the addition of a pulse generator to permit functional checks of the counter.
- h. A new work area curtain was installed during the month.

D. Events Influencing Costs

During the month of May, F Processing Operation used 42.9 man-hours of nonexempt overtime.

Maintenance costs for May are expected to be high because of maintenance and repair work accomplished during the CG-558 outage.

Replacement of 10 rear face boots decreased daily gas loss.

F POWER OPERATION

A. Operating Experience

- 1. Normal process water flow to the reactor was established at 6:05 a.m. on May 17 preparatory to start-up. After several

A. Operating Experience (Continued)

pressure variations requested by Processing Operation, stable flow conditions were established at 11:25 p.m. on May 19.

2. At approximately 6:00 p.m. on May 3, a rupture of the cast iron fittings in the 36-inch raw water line located in the west side of the 183 Building resulted in flooding the building and vicinity, and interrupted the flow test being conducted in connection with Project CG-558. In addition to the damage to piping, a considerable area of ground and railroad right-of-way adjacent to the building was washed out. Repairs were completed and water flow was re-established at 7:30 p.m. on May 5. Installation of additional supports for raw water lines and fittings in both east and west cone valve pits was completed on May 20. The incident is covered in separate report of investigation by Construction Engineering Operation.
3. The three-inch drain line for the 42-inch west raw water line adjacent to the 182 Building which had been recently installed by Construction forces broke on May 7. It was necessary to take this line out of service for repairs. The resultant leakage caused ground to settle within approximately a fifty foot radius. Exploratory excavations were made for inspection of adjacent raw water export line. The pipe and supports were found to be satisfactory. All repairs were completed and water systems were returned to normal service on May 10.

B. Equipment Experience

1. The 24-inch cone valve for west raw water supply line to 183 Building was found to be damaged on May 14. Temporary repairs were made by installing a fabricated steel shaft stub in place of the broken casting. The unit was returned to service at 6:00 p.m. on May 16.
2. Difficulty with one of the motor winding temperature indicating circuits on No. 4 pump motor in 190 Annex Building has been determined to be a faulty thermocouple. Replacement will be made at the time other repairs to motor winding will be made. The remaining temperature indicators are satisfactory.

C. Improvement Experience

1. The program to increase filter efficiency was completed with the addition of approximately three inches of sand to the east filters in the 183 Filter Building.
2. Facilities for unloading sulphuric acid from truck tanks were completed during the period. Truck shipments will reduce shipping costs and facilitate the unloading of acid.

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D. Events Influencing Costs

1. Overtime

A total of 260.9 hours was worked by Power Operation personnel during the month of May.

2. Others

- a. Installation of acid unloading facilities for tank trucks.
- b. Repairs on west side cone valve of 183 Building.
- c. The painting of powerhouse chimney breechings.
- d. Boiler repairs in the 184-F Building.

F RADIATION MONITORING OPERATION

A. Radiation Occurrences

Two radiation lapses of control were charged to F Reactor Operation. Both occurred on April 30, 1957. One was charged to F Processing Operation and one was charged to F Maintenance Operation. No radiation incident was incurred.

B. External Exposure Control

Dose rates in excess of 3 r/hr were encountered on two occasions, once while cutting wire on a graphite stringer during removal operations, and once while removing a tube splitter from a piece of tubing.

Dose rates at the edge of the burial trench rose to 130 mrad/hr after cleanup and removal of contaminated material following the CG-558 outage.

Decontamination of the interior of the downcomer reduced radiation levels from 225 mr/hr to 75 mr/hr prior to repair work.

C. Contamination Experience

Contamination was generally well controlled during the month. No respiratory protection was required during discharge area work except for short periods of time during critical operations. Upon start-up of the reactor, only minor concentrations of effluent vapor contamination were detected. Gas activity to 100 mrad/hr in the work area was traced to several leaks in the bellows of the thermal shielding cooling water loop system. Repairs of these leaks resulted in a sharp drop of gas activity on the C Elevator.

Contamination of up to 6,000 c/m was detected over the area flooded when the raw water supply line to 183-F ruptured. The contamination was short-lived and decayed below detectable levels within two days.

C. Contamination Experience (Continued)

The maximum activity detected on drained 183-F filter beds was 5,000 c/m. The measurement was made approximately 24 hours following a purge at 105-DR. 500 c/m was detected on the surface of the 183-F settling ponds. Activity was concentrated in the floating scum and foam.

No vehicular contamination was detected.

D. Events Influencing Costs

A total of 185 man-hours of overtime was worked by Radiation Monitoring personnel at 100-F during May. Sixty hours of this overtime were to cover ball washing operations and were charged to other Radiation Monitoring Operations.

F MAINTENANCE OPERATION

A. Equipment Experience

The prime activity in Maintenance was in completing jobs scheduled during the CG-558 outage; performing the necessary inspections, tests, and checks on equipment before start-up on May 18; and the cleaning up of work areas and tools after the outage.

1. Electrical - The modification of the No. 1 and No. 2 safety circuit, as outlined in Design Change #137, was completed.

The revisions to the main control board annunciator were completed. The Ball 3X System power supply was modified.

2. Instrument

105 Proportional Counter System - The dual pre-amplifier for the proportional counter was added during the CG-558 outage.

185 Simplex Filter Flow Controllers - Following modifications for increased flow through the 183 Building filters, trouble was experienced with ruptured diaphragms and bent diaphragm stems on the Simplex flow controllers. Non-rotating linkage cable has been ordered for installation to improve operation of the controllers.

3. Mechanical

Downcomer - 105-F - A water-cooled condenser was installed in the vent line from the top of the downcomer to condense the vapor from the downcomer and to allow the condensate to flow back into the downcomer.

Vertical Safety Rods - 105-F - A complete functional check and inspection of the vertical safety rods was completed during the

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3. Mechanical (Continued)

outage. The sphincter seal was replaced on #24 VSR. Oil leaks in the VSR winches were corrected.

Sight Glass - Relief Riser - 105-F - A sight glass was installed on the relief riser, rear face, to show water level during helium leak detection.

Pumps - 1608-F - Since start-up from the CG-558 outage, the two electric pumps in 1608-F have not been able to develop sufficient pressure at high flow to open the check valve in the discharge line from the 1608-F sump to the effluent line. No. 2 electric pump has been pulled for inspection and overhaul.

B. Shift Maintenance Activities

The primary efforts of the F Area shift crews were devoted to CG-558 outage work until start-up on May 18. Since May 18, they have worked in 100-H Area on CG-558 outage work approximately 50 percent of the time.

C. Maintenance Engineering, and Planning and Scheduling

Electrical Engineering - The main activities were related to installation, ATP's, and "As-Built" drawings on safety circuit revision, wiring changes, and annunciator system revisions as completed during the CG-558 outage.

Instrument Engineering - The primary efforts of Instrument Engineering were on the proportional counter system, relocating the Ball 3X mercoids, and changing the Ball 3X mercoids to a dual system as completed during the CG-558 outage.

Mechanical Engineering - The main activities were concerned with a study of pressure vessels for compliance with ASME Code requirements; and a study of the Fischer control valves on the 190 steam turbines to correct for steam leakage and excessive maintenance repairs.

Planning and Scheduling - All maintenance and PM work requiring shutdown time, scheduled during the CG-558 outage, was completed. Approximately 20 percent of available manpower was assigned to PM work in this period.

The primary efforts of property control continued during this period on the retirement of capital property and equipment removed as per the CG-558 project.

D. Events Influencing Costs

Overtime - A total of 1140 overtime man-hours was used to maintain F Area facilities.

C. N. Gross, Manager
F REACTOR OPERATION

CN Gross:GBJ:det

H REACTOR OPERATION

May, 1957

I. ORGANIZATION AND FUNCTION

H Administration and Personnel Development Operation assumed the responsibility for scheduling shift rotation for welders.

Responsibility for providing routine contamination surveys for the IPD Fire Protection Operation was transferred from the Radiation Protection Operation of Hanford Laboratories to H Radiation Monitoring Operation.

II. PERSONNELA. Force Report

	<u>April 30</u>			<u>May 31</u>			<u>Net Change</u>
	<u>NE</u>	<u>E</u>	<u>Total</u>	<u>NE</u>	<u>E</u>	<u>Total</u>	
General	1	1	2	1	1	2	0
Adm. & Pers. Dev. Oper.	2	3	5	2	3	5	0
Processing Operation	36	8	44	35	9	44	0
Power Operation	70	11	81	70	11	81	0
Radiation Monitoring Oper.	12	5	17	12	4	16	-1
Maintenance Operation	82	16	98	84	16	100	+2
Central Maintenance Oper.	73	15	88	74	15	89	+1
Total	276	59	335	278	59	337	+2

B. Personnel Changes

W. J. Tatum, Jr., Supervisor, Radiation Monitoring, transferred into H Processing Operation as Supervisor - Supplemental Coverage.

There were seven transfers into H Reactor Operation, five transfers out, one reactivation, and one termination.

III. PERSONNEL ACTIVITIES

W. J. Ferguson attended "General Electric Machine Tool Seminar" in Schenectady, New York during the week of May 20. E. E. Mitchell attended "Pacific Northwest Instrument and Automation Exhibit" in Seattle, Washington on May 9 and 10.

All H Reactor Operation Managers completed the 20 weeks Professional Business Management - I course.

Exempt employees attended the following courses:

Safety and Fire Prevention - L. C. Goodwin and D. Sowden
G. E. Salary Plan - P. R. Nelson
Labor Management Relations - J. P. O'Connell and R. C. Theil

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III. PERSONNEL ACTIVITIES (Cont'd)

Process Orientation - R. C. Theil
Management Orientation - R. K. Browning

IV. SAFETY AND SECURITY

There were no disabling injuries or security violations. Twenty-seven Medical Treatment injuries and one Serious Accident were reported. The Serious Accident, No. 10-57, occurred in 183-H Building when a glass reflector ruptured. One employee suffered cuts on the hand and head.

V. NON-ROUTINE REPORTS

"A New Method of Handling and Sorting Irradiated Balls," by R. B. Hamilton and D. R. Resner.

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

A. H Administration and Personnel Development Operation

1. Administration

Detailed summaries were prepared of the position scope of Electrical, Instrument, and Day Mechanical Supervisors and submitted to Salary and Wage Administration Operation, together with manuals and blueprints to exemplify the complexity and scope of these positions for comparison with similar positions throughout the Company.

A detailed review of the absence records of all H Reactor Operation non-exempt employees from 1954 to date was made. A letter which summarizes the findings of this review and a list of personnel who were absent ten or more times in 1956 has been prepared for distribution to the individual component managers.

Lists required for the new Plant Telephone Directory were prepared and forwarded to the Plant Telephone and Radio Operation.

2. Landlord

Buildings 1760-H and 1761-H were released from Project CA-702 for beneficial occupancy. The 1761-H Building was occupied on May 11, and the 1760-H Building is scheduled for occupancy on June 8.

2. Landlord (Cont'd)

Approval was given for reassignment of space in the 1704-H Building to the Financial and Facilities Engineering Operation after the Employees Relations Operation moves from the 1704-H to the 1761-H Building.

B. H Processing Operation

1. Production

Input production exceeded the forecast by 24.3 per cent.

Maximum equilibrium power levels were limited by individual tube powers of 750 KW.

2. Operating Experience

a. Operating Continuity

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

<u>Date</u>	<u>Hours</u>	<u>Reason</u>
5-1-57	51.3	Shut down to locate a water leak in tube 2892-H.
5-8-57	0.3	Scrammed while adjusting the operating range of Panellit gage 1887-H.
5-9-57	21.8	Shut down to remove a ruptured slug from tube 1881-H.
5-10-57	2.7	Shut down to remove a ruptured slug from tube 1859-H.
5-12-57	479.3	Shut down for charge-discharge, tube replacement and Project CG-558 work.

b. Equipment Experience

Process Tubes - Currently, defective front Vanstone flanges on new tubes are the principal source of water leaks at H Reactor. The 30 gallon a day leak from the front flange of tube 2892-H required a sustained vacuum of 12 minutes for detection by the helium method.

3. Improvement Experience

Oil Drain System - A system for collecting charging oil from the rear of the process tubes and disposing of it was a part of the original reactor equipment. This equipment was never used and occupied so much space that many rear face maintenance jobs were difficult to perform. The oil headers and drain were removed and scrapped.

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3. Improvement Experience (Cont'd)

Raw Water Cross-tie - The new raw water cross-tie between risers was placed in service this month. This system introduces a great deal of flexibility in the emergency water back-up. By combining this installation work with the CG-558 outage, a cost saving of \$27,000 was realized.

4. Events Influencing Costs

Overtime usage for the month was 32.5 hours. Most of this was required for shift overlap.

C. H Power Operation

1. Operating Experience

Prior to the extended CG-558 outage which started May 12, process water flow was reduced four times for a total of 72 hours. Process water flow was transferred to the temporary construction riser in 105-H Building on May 23, and is being delivered from No. A group of turbine driven pumps.

Raw water quality varied during the month due to spring run-off. No adverse water treatment problems were experienced.

High pressure differential was experienced across B and C header basket screens in the 190-H Building due to plugging of the strainers. This condition resulted when an operator inadvertently opened the motor operated valves in the storage tank by-pass lines, thereby flushing corrosion products into the process water stream. Water flow to the reactor was not interrupted; however, it was necessary to alter pumping configuration.

The 1906-H Building waste water lift station was placed in service on May 21 when river elevation reached 385.5 feet.

Analytical Laboratories performed routine control services and special analyses on 133 essential material samples, 47 water samples, 78 process control samples, and 47 special analyses.

2. Equipment Experience

The installation and calibration of boiler feedwater flow nozzles was completed on all 184-H Building boilers on May 17.

Comprehensive alignment checks have been made by plant forces on all turbine pumping units in 190-H Building Pump Room. A considerable degree of misalignment was caused by the piping modification work under Project CG-558. At month end pump groups 1 through 3 were complete.

3. Improvement Experience

An inspection of 183-H Building No. 3 filtered water pump showed that destructive cavitation is quite pronounced on all suction blades. A comprehensive compilation of data has been completed by Design Operation for review.

D. H Radiation Monitoring Operation

1. Radiation Incidents

There were no radiation incidents involving overexposure of personnel. Five lapses of control were recorded. Three involved unplanned or uncontrolled exposures and resulted primarily from poor communication, and two resulted from violation of established procedures.

2. External Exposure Control

High radiation levels in the 105-H Building Discharge Area have remained a problem through the month. A personnel dose rate of 800 mrad/hr was required to complete helium leak testing four hours after reactor shutdown. No purge was attempted before this outage, and very little change of dose rates was noted from previous shutdowns when purges were utilized. This indicates that reactor purges are not effective in reducing the radiation levels in the Discharge Area.

Decontamination of the Discharge Area has permitted the use of face shields in place of full face masks to perform work associated with the CG-558 shutdown.

3. Contamination Control Experience

Decontamination of the gas tunnel has reduced dose rates from 400 mrad/hr to 25 mrad/hr, and has permitted much of the maintenance work to be performed without respiratory protection.

Work in the 184-H Building deaerator revealed contamination up to 1,000 c/m on internal baffles. Some contamination was spread outside this equipment; however, no personal contamination occurred.

The nine cases of shoe contamination which were recorded during the month occurred during tube replacement. Decontamination was successful in eight of the nine cases. The employee's shoes were replaced in the ninth case. Two cases of skin contamination were recorded. Both were successfully reduced to less than detectable levels, and no overexposure resulted.

A total of 50 vehicles were surveyed during the month. None were found contaminated.

4. Radiation Training

The majority of the activity continued to be in the presentation of radiation protection information to H Reactor Power and Maintenance Operations personnel.

Fifty clerical and stenographic employees assigned to 100-H Area, many of them new to the plant areas, attended the first of three orientation meetings on radiation protection.

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5. Events Influencing Costs

A total of 315 hours of overtime were required during the month to provide monitoring service for rupture removal and tube replacement. Overlap of the F and H Reactor Operations CG-558 outages required 150 hours of this total.

E. H Maintenance Operation

1. Equipment Experience

Design Change No. 118 - The Beckman safety circuit re-set design change has been completed.

Surplus Wiring - During the CG-558 outage, the surplus wiring is being removed from the back of the control desk, the central viewer, and the IBM room in the 105-H Building.

Tube Replacement - During the outage of May 12, 76 tubes were replaced in H Reactor at a rate of 1.31 hours outage time per tube.

2. Shift Maintenance

The shift crews have spent approximately 75 per cent of available work time in 100-H Area, including the scheduled and unscheduled outages.

3. Planning, Scheduling, and Engineering

Gas Instrumentation - Drawings were issued to the instrument maintenance group for the relocation of the Moore Nulmatic differential pressure transmitters. This change is being made to permit maintenance of drip leg level indicators while the H Reactor is operating.

Panelit Ground Detector - Circuit diagrams and wire routing diagrams for the Panelit ground detector and associated equipment were prepared during the month. As-built prints will be provided upon completion of the work.

Nitric Acid Dummy Decontamination Facilities - A minor design change was submitted and approved to provide adequate facilities for safe decontamination of dummies with nitric acid. Recommendations for venting and fume exhaust facilities and the necessary piping were included. A minor design change record was sent to Drafting Operation for SK drawings.

Disposition of property made excess by the CG-558 project is progressing satisfactorily. As of May 31, the only significant items remaining to be excessed were 14 electric 800 hp motors and 16 pumps. A problem, unique to 100-H Area, was encountered when 15 of the 19 electric 800 hp motors were found to be internally contaminated. Contamination levels varied from 300 to 1000 c/m. It is believed that the contamination is due to airborne particles deposited by cooling air flow.

4. Events Influencing Cost

During the report period, 1,421 hours of overtime were utilized. This is 8.2 per cent which is more than the forecast.

F. Central Maintenance Operation

1. Shift Activities

Tube replacement activities increased slightly during May as compared to April.

Problem tubes in all reactors, except H, have been 95 per cent rehabilitated. Like results at H Reactor should be realized during the current CG-558 outage.

Below is a tabulation of process tube activities in all Areas:

	<u>B</u>	<u>C</u>	<u>D</u>	<u>DR</u>	<u>H</u>	<u>F</u>	<u>KE</u>	<u>KW</u>	<u>Total</u>
Problem Tube Channels Cleared:	1					3			4
Ruptures Removed:	3		1	2	2		5	3	16
Stuck Charges Removed:	7								7
Tubes Pressure Tested:	96		1	95	226	37	4	3	462
Tubes Installed:	90			1	76	19	1		187
Tubes Split and Removed:	90			1	76		1		168
I & E Nozzles Installed:									0
Scheduled Outages:	2	1	1	1	2	3	1	1	12
Unscheduled Outages:	4		2	2	3		4	2	17
Problem Tubes Remaining:	7	1	5	3	21	8			45

2. Central Shops Activities

Installation of a second monorail for material and equipment handling has been completed to service the planer and the boring mill. Small jib cranes and tool racks have been designed to aid craftsmen in handling face plates, chucks, and other heavy tooling where a monorail is not available.

Five CG-558 pump impeller assemblies were repaired in the shop during May. The sixth was received in the shop and is being reworked at month end. This was the last assembly from 190-DR Building. There are still four units to be repaired from 190-B Building.

3. Painting

The paint crews have concentrated on the exterior of 100-D and 100-F Area Buildings during the past month. The backlog, due to the addition of summer painting to the normal routine schedule, remained unchanged.

4. 108-D Hot Shop

Replacement and repair of tube removal tools increased during the month due to greater tube removal activity.

5. Central Maintenance Engineering

Redesign Short Process Tube Leak Tester - This tool has been redesigned

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5. Central Maintenance Engineering (Cont'd)

and tested. New prints are being made at 100-F Area. The redesign consisted of changing the points of location from the lug ring to the nozzle face. This removes the inaccuracy due to loose, worn or bent lug rings.

Tube Knot Drills - All four "two-way" drills for drilling through crumpled or collapsed process tubes have been tested, and two were selected for continued use. In-pile tests have been made, and the equipment has been turned over to the shift crews to replace the standard twist drill used in the past.

"Led-Plate" on Nozzle Gasket Evaluation - Tests were made on 105-H Reactor nozzle gaskets during April and inspected during May. All gaskets broke loose with great ease. Consequently the application of Led-Plate on all nozzle gaskets is recommended.

G. Events Influencing Costs

In-unit costs continued high due to the installation of the additional mono-rail and exchange installation of two grinders. It was, however, reduced by the elimination of need for borrowed servicemen and drivers, due to the addition of one driver and one serviceman to the organization.

Manager,
H REACTOR OPERATION

RTJessen:HCS:CDS:met

KE-KW REACTOR OPERATIONMAY, 1957GENERALI. Organization and Functions

There were no changes of organizational nomenclature or assigned responsibilities during the month.

II. Personnel

	<u>April 30</u>			<u>May 31</u>			<u>Net Change</u>
	<u>E</u>	<u>NE</u>	<u>Total</u>	<u>E</u>	<u>NE</u>	<u>Total</u>	<u>of</u> <u>Total</u>
General	1	1	2	1	1	2	0
A. & P. D. Operation	4	1	5	4	1	5	0
KE Processing Operation	8	35	43	10	35	45	+2
KW Processing Operation	8	36	44	9	35	44	0
Power Operation	13	76	89	13	75	88	-1
Radiation Monitoring Operation	9	19	28	8	17	25	-3
Maintenance Operation	20	134	154	20	136	156	+2
Supplemental Crews	<u>10</u>	<u>66</u>	<u>76</u>	<u>10</u>	<u>66</u>	<u>76</u>	0
	72	368	441	75	366	441	+0

J. C. Clausing, Supervisor, KE-KW Power Operation, was assigned to the KW Processing Operation as Operations Supervisor, effective May 1, 1957.

C. E. Nelson, Analyst, KE-KW Power Operation, was assigned as Power Supervisor, KE Power, B Shift, effective May 1, 1957.

F. L. Hughes, Power Supervisor of the B-C Reactor Operation, was assigned as Analyst, KE-KW Power Operation, effective May 15, 1957.

R. G. Warner, new hire, was assigned to the KE Processing Operation as Operations Supervisor, effective May 6, 1957.

G. L. Madsen was reactivated from Military Service and assigned to the KE Processing Operation as Operations Supervisor, effective May 9, 1957.

R. T. Woolsey, Analyst, KE-KW Radiation Monitoring Operation, terminated effective May 31 to accept employment with the AEC.

R. M. Nelson, Supervisor, KE-KW Radiation Monitoring Operation, was assigned as Analyst, same operation, effective May 31, 1957.

III. Personnel Activities

R..S. Bell visited the Savannah River Plant from May 27 to May 29.

F. M. Stratton and W. R. Moon attended a data processing equipment demonstration of the Consolidated Electrodynamics Corporation.

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The Labor-Management Relations training course was attended by eleven exempt personnel.

The GE Exempt Salary Plan lecture was attended by four exempt personnel.

The Process Orientation Course was attended by three exempt personnel.

A series of five lectures discussing new reactor designs was led by A. B. Carson, Manager, Process Design Operation, for interested IPD personnel during the month of May.

R. S. Bell conducted one non-exempt and three exempt information meetings during the month.

The first in a series of meetings of shift supervisors and chief operators was held on May 31 to discuss ways and means of passing information between shifts and to improve the coordination of reactor control.

G. Gast of the Fiberlay Company visited the area on May 8 to prepare plastic impressions of high lift pump impeller.

IV. Safety and Security

There were no disabling injuries during the month. Thirteen medical treatment injuries were reported.

Four employees were selected as winners of the "Safe Worker" award as part of the K Plant Safety Council's current program.

No security violations were incurred.

V. Non-Routine Reports

None.

VI. Inventions and Discoveries

All persons engaged in work that might reasonably be expected to result in inventions or discoveries advise that, to the best of their knowledge and belief, no inventions or discoveries were made in the course of their work during the period covered by this report.

VII. Component Activities

A. KE-KW Administration and Personnel Development Operation

1. Administrative Activities

The position guides, Supervisor, Maintenance (Relief) and Supervisor, Maintenance (Days), 1706-KE-KER were reviewed and re-evaluated.

A survey was completed of plant personnel to determine the extent of participation in the adult Salk vaccination program. The results were forwarded to the Public Health Operation.

The plant requirements for experienced BS-MS technical personnel during FY 1958 were submitted to Personnel Development and Placement Operation.

The KE-KW Reactor Operation functional charts were revised and submitted to C. F. Klepper, Employee Compensation Operation.

Scheduling of K Plant Rescue Crew members to the refresher training course was coordinated with the Fire Protection Operation.

A security clearance survey was made of all plant personnel, and requests for changes forwarded to the Security and Patrol Operation.

Revised organizational and personnel listings of KE-KW Reactor Operation were submitted to the Plant Telephone and Radio Operation.

Four IPD Advices were reviewed and comments submitted to the issuers.

A time study of daily activities of all PAPD personnel was completed.

2. Personnel Development

Two supervisors were scheduled to attend the sixth in a series of Work Simplification meetings to be held in F Area.

Arrangements were made for K Plant female personnel to participate in the plant tour.

Four managers, Power analyst and Maintenance supervisor visited Midway Substation as part of the plant information program.

V. R. Griffith, Training Specialist, made training contacts with seven exempt and 80 non-exempt personnel of IPD Power Operations.

3. Cost Activities

The FY 1957 Professional and Trade Society Meeting budget was reviewed and funds were released to Research and Engineering. The FY 1958 budget was prepared.

An analysis of KE-KW Processing gas usage for the period May, 1956 through April, 1957, was submitted to the Processing Managers.

4. Landlord Activities

Arrangements were made for weed control work within the area.

The project of expanding the 1704-K Conference Room was completed.

Results of the 1704-K Building cooling system study were reviewed. An Appropriation Request for necessary equipment to correct the building cooling system deficiencies was initiated.

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B. KE Processing Operation

1. Production

Input production was 96.8 percent of forecast. The maximum level for the month was 60 units lower than the previous month's high. The lower level was a result of unbalanced discharges and decreased flattening efficiency due to the approaching burnout limit of the enrichment metal.

2. Operating Experience

- a. Operating Continuity - Outage time for the month totaled 150.6 hours. Operating continuity was affected by the following events:

<u>Date</u>	<u>Outage Hours</u>	<u>Results</u>
5-1	14.7	Extension of unscheduled outage from April 30, caused by a ruptured slug in 1480-KE. Outage time following rupture removal was used for processing metal and Ball 3X mixing.
5-11	29.1	Unscheduled outage for removal of ruptured slug from tube 1984-KE. Remaining outage time was used for processing metal.
5-13	31.2	Unscheduled outage for removal of a ruptured slug from tube 2570-KE. The tube and charge were removed.
5-23	40.4	Reactor was manually scrammed nine hours before scheduled outage time when temperature control could not be maintained due to a severe heat cycle. The KER Loop Number 4 was charged and put on recirculation. Scheduled metal processing was completed.
5-25	0.4	Beckman scram during startup due to a switch failure in the LLPP system.
5-25	3.6	Panellit scram due to rupture in 1876-KE. The rupture was removed with the charging machine.
5-27	0.5	Panellit scram on row Number 44.
5-30	30.7	Panellit scram due to rupture in 2881-KE. The rupture was removed with the charging machine.

- b. Equipment Experience - Three of the four slug ruptures experienced during the month were removed by charging machine pressures. The stuck rupture procedure was required to remove the rupture in tube 2570-KE. The tube failed to hold pressure when leak

tested and was removed and replaced. A total of 89 gallons of water was subsequently recovered from the reactor. High radiation conditions were encountered on the rear face following rupture removal due to ruptured slug particles lodged in the rear nozzle. Removal of the rear nozzle with extension tools reduced radiation levels to normal.

The temperature monitor was placed in the Number 1 Safety Circuit during the last three startups of the month in accordance with the revised process standard after a check of all safety circuit trip controllers. No difficulties were encountered. A high trip occurred on the temperature monitor due to a power supply transfer and would have scrambled the reactor had the temperature monitor been in the safety circuit at the time.

Three thermobulbs and one connector were replaced on process tubes, and six shield cooling tube thermocouples were replaced during the month.

Nine new gas seals were installed. A Silastic 916 seal containing five percent Molycode was installed on VSR Number 31 and a seal containing ten percent Molycode was installed on VSR Number 37 on a trial basis. Regular seals were installed on the other rods. The old type seal on VSR Number 31 became detached from the seal flange and was riding on the rod. All seals were inspected and tightened. A significant reduction in gas loss resulted from this corrective action.

Ten hoppers of 3X balls were mixed to the desired ratio of seven parts boron to three parts carbon steel balls. Fourteen hoppers remain to be mixed.

Loops Number 2, 3 and 4 of KER were pressure tested at 2500 psi on May 13. Loop Number 4 received its initial loading of heavy metal on May 24, and operated satisfactorily on recirculation to month end. Loops Number 2 and 3 were operated on single pass cooling because of the loss of one pump on each loop. Flushing pigtails were installed on the front and rear header of Loop Number 1 to permit line flushing during reactor operation. The flushing operation is part of the preparatory work required for the conversion of Loop Number 1 to organic cooling.

3. Improvement Experience

- a. PT IP-4-A, Irradiation of Extruded Cored Slugs - Three tubes were charged with prepared metal for this production test and one tube was discharged.
- b. PT IP-51-A, Irradiation of Three 1.8 Inch Diameter Cored Fuel Elements in a KE Front to Rear Test Hole - Production test material was discharged from test hole tube Number 865 on May 24. The tube was recharged with B type material.

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- c. PT 105-550-E, Inpile Facilities of 1706-KE - Three tubes were charged with material for this production test on May 12. One tube was discharged and recharged with this PT material on May 1.

C. KW Processing Operation

1. Production

Input production for the month was 108.1 percent of forecast due principally to higher than forecast time operated efficiency and power levels. The maximum level for May was 75 units below the April high due to increased inlet water temperatures and reduced flattening efficiency.

2. Operating Experience

- a. Operating Continuity - Outage time for the month totaled 92.6 hours. Operating continuity was affected by the following events:

<u>Date</u>	<u>Outage Hours</u>	<u>Remarks</u>
5-6	28.8	Panellit trip due to a slug rupture in 5166-KW. Following rupture removal, the outage time was used for metal processing and routine maintenance.
5-22	39.5	Scheduled outage for processing metal. Production Test IP-76-C was conducted for calibration of the HCRs extending the outage by 13.9 hours.
5-25	24.3	Unscheduled outage to discharge ruptured slugs in tubes 2078-KW and 2080-KW. Remaining outage time used for Ball 3X mixing and routine maintenance.

- b. Equipment Experience - The high Panellit trip on May 6 was caused by a ruptured slug in tube 5166-KW. The metal was removed with the charging machine. Visual examination of the column indicated side bowing which resulted in a "side hot spot" failure. Following the rupture removal, radioactive gas in the storage area hindered shutdown work until the rupture was canned.

On May 25, KW Reactor was shut down to investigate rupture indications on crossheader Number 20. Two tubes, 2078 and 2080-KW, were identified as rupture suspects. Both rupture columns were readily discharged with the charging machine. Radioactive gas was emitted into the storage area by one of these ruptures; however, the identity of the gas emitter was not determined.

Nine safety circuit trips, eight of which were spurious, were experienced on the temperature monitor system in May and would have resulted in reactor scrams if the temperature monitor had been in the safety circuit. A faulty thermobulb for tube 3672-KW was replaced with a new Lewis thermobulb.

The Panellit sensing line to tube 3842-KW was examined during the May 6 outage and found to contain foreign material. The fitting was replaced. Examination of the inlet screen on tube 0971-KW during the same shutdown showed it to be partially plugged by rusted welding rod pieces. Partial plugging was suspected because of the high outlet tube temperatures experienced prior to the shutdown. Four additional plugged Panellit sensing lines were found during the May 22 outage. These were cleared by installing new line-to-venturi adapters. Sixty-eight new type Panellit gages were installed during May. A faulty jumper is suspected to have caused the trip on row Number 44 that occurred just prior to the shutdown for HCR recalibration.

Three Ball 3X hoppers were mixed to the desired ratio of boron to carbon steel balls during the May 22 outage. No signs of moisture were found in twenty hoppers checked.

3. Improvement Experience

- a. PT-IP-76-C, Horizontal Rod Calibrations KE-KW Pile - The rod calibration test was conducted during the May 22 outage. The test was successfully completed without incident.
- b. Experimental Level Work - The Snout Facility was used by Irradiation Testing Operation to accomplish four short duration irradiations during the month. In addition, eight ORNL samples were charged into the 2D test hole and thirteen graphite samples were removed from the 2B test hole.

D. KE-KW Power Operation

1. Operating Experience

- a. Electrical Peak Control Efforts - A new electrical peak demand was established on May 3. At the time this peak was established, the K generators were at maximum load with 10,000 KW excess being carried. Peak control efforts were in effect a total of 9 hours during the month. This effort represented a substantial saving in electrical billing to IPD for the month.

2. Equipment Experience

- a. Number 6 High Lift Pump, 190-KW - The services of the GE Service Engineer of Seattle were obtained to make a thorough examination of the subject pump following its removal from service due to excessive noise and vibration in the speed increaser gear. At month end the motor pedestal bearing was being shifted slightly to take additional motor thrust. Tests will be conducted to determine the results of this change.
- b. Class "A" Overhaul Program of 181 River Pumps - The current pump overhaul program was completed. Class "A" overhauls were completed on one unit in 181-KE and two at 181-KW during the program.

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3. Improvement Experience

- a. Gravity Acid Feed System - The new acid system was placed in service at 183-KW on May 8 and at 183-KE on May 15. Operation to date has been satisfactory. A work order to Minor Construction to remove the temporary acid feed system piping and pumps and to accomplish the desired revamping of the piping to the old storage tanks has been issued by the Project Engineer. Work on this phase is scheduled to start the first week of June.
- b. RC-3 Valve Replacements - The new RC-3 valve at 190-KW was satisfactorily tested on May 3. This installation completed the replacement program in K Plant.
- c. High Flow Test - Number 1 High Lift Pump - 190-KE - Operation of this unit at the accelerated flow rate, started January 1, was terminated on April 30. This unit was dismantled and on May 8, a representative of the Fiberlay Company of Seattle again made impressions of the impeller. Visual examination and comparison of these impressions with those made November 14, prior to the start of the test, indicated little or no evidence of cavitation. Process Engineering will document the findings and test results.

4. Events Influencing Costs

- a. Water Treatment - An 11 percent reduction in unit treatment cost was achieved. This was due primarily to the lower average acid feed required during May for pH correction.

E. KE-KW Radiation Monitoring Operation

1. Radiation Occurrences

No Radiation Incidents were experienced during the month. One Lapse of Radiation Control was reported. This involved the spread of contamination outside the burial ground perimeter fence.

2. External Exposure Control

Dose rates up to 200 rads/hr at two inches and 5 r/hr at four feet were encountered on the nozzle of tube 2570-KE after the discharge of a ruptured slug. The abnormal dose rates were caused by particles of the ruptured slug lodged in the nozzle. The maximum dose rate to remove the nozzle with extension tools was 10 rads/hr, including 4 r/hr at six feet.

Personnel of the Materials Development Operation, HLO, removed six feet of the graphite-thermocouple stringer from the rod cave. The maximum dose rate for the work was 1.5 r/hr.

3. Contamination Control

Contamination up to 200 mrad/hr was detected on the ground outside the burial ground perimeter fence. No personnel exposures were involved.

4. Radiation Experience

A Radiation Incident Investigation was conducted at 100-B Area concerning a 100-B film badge exposure of 636 mr for a two-week period, involving a Radiation Monitor assigned to the KE-KW Radiation Monitoring Operation. The Investigating Committee concluded that the employee could not have received the exposure indicated. Formal documentation of the investigation was in document HW-50386 by the Radiological Engineering Operation.

F. KE-KW Maintenance Operation

1. Instrument Experience

- a. Pressure Monitor Systems - Corrections were made on 71 mercury separations. Adjustments were made to 2246 gages, 76 percent of these being range changes and checks made during outages. Two hundred and ninety-three new type gages were installed in both 105 Buildings.
- b. Flow Instrumentation Changes - Range changes were completed on the filter flow controllers in 183-KE and KW, and also on the process flow instrumentation to accommodate increases of cooling water flow.

2. Electrical Experience

- a. Loud Speaker System - A paging system in 105-KW consisting of six speakers at various work locations was completed.
- b. Sludge Valve Timers - 183-KE - The timers have been removed and replaced with limit switch controls. The change is expected to reduce the maintenance of the system by 200 manhours per year.

3. Mechanical Experience

- a. "D" Elevator - 105-KW - The steps were removed and a platform installed from the rear entry doors at each level, near and far, to span the opening between the door and the elevator.
- b. Backwash Valve - 183-KE - A backwash valve failed when a "stay pin" came out of the stem nut permitting the stem to unscrew. A new gate was installed and other necessary repairs accomplished.

4. Shift Maintenance Activities

Approximately 55 percent of the available manhours was spent in the area. Work in K Area consisted primarily of assistance in scheduled

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equipment overhauls and general area repairs.

5. Maintenance Engineering and Planning and Scheduling

- a. Temperature Monitor System - In accordance with Process Standards, the temperature monitor system was tied into the safety circuit during reactor startup.
- b. Riser Mercoid Impulse Line - A preliminary study revealed that a break in the riser mercoid impulse line would result in a third safety ball trip. A design change will be prepared to correct this condition.

6. Planning and Scheduling

Class "A" overhauls were completed on 89 items of equipment and Class "B" overhauls on 211 items.

7. Events Influencing Costs

- a. Overtime Usage - A total of 452.0 hours of Maintenance overtime was worked in the KE-KW Reactor Operation.

Hours worked in K Area:	K Personnel	368.6
	Others	<u>83.4</u>
		452.0

The total hours worked by K personnel in all areas was 1,704.6, approximately twice the amount forecast.

G. Supplemental Crews Operation

1. Events Influencing Costs

There were 369.5 hours of non-exempt overtime worked by Supplemental Crews personnel, all of which was charged to the particular area involved. No exempt overtime was worked.

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	14	100-F	18
100-C	4	100-H	35
100-D	11	100-KE	5
100-DR	7	100-KW	6

R. S. Bell
Manager
KE-KW Reactor Operation

RS Bell:GEG:prb

PRODUCTION OPERATIONMAY, 1957I. ORGANIZATION AND FUNCTIONS

No change.

II. PERSONNELForce Summary

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

III. PERSONNEL ACTIVITIES

Several members of the Production Forecasting and Plant Scheduling Operation occupied new quarters in the 1761-H Building. This move, which consolidates in one location all units of this Operation except Production Scheduling (which remains in the 105-H Building), will promote better working conditions for the entire group. Offices formerly occupied by Operations Analysis in the 190-H Building were relinquished to the 100-H Area landlord.

J. R. Young completed his training sessions on Practical Business Writing.

IV. SAFETY AND SECURITY

All personnel except one 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>Classi- fication</u>	<u>Author</u>
HW-49852	Use of a Tube Power Effect in Calculating Reactor Process Tube Corrosion.	Secret	EF Fairweather

This document presents an analysis of process tube corrosion data that factored in an evaluation of the effect of tube power on tube corrosion.

HW-50370	Tube Corrosion Forecast FY 1958 - Comparing Two Different Postulated Corrosion Rates.	Unclassified	EF Fairweather
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This document presents two possible corrosion rates based on trends and other data; presented primarily for maintenance tube replacement manpower planning.

<u>Doc. No.</u>	<u>Title</u>	<u>Class'f'n</u>	<u>Author</u>
HW-50095	Selection of Metal Discharge Intervals	Confiden'l	JR Young

This document presents an analysis of related reactor production losses in order to determine the proper scheduling of discharges.

HW-50105	Interim Sequence Sheets and Charge Cards	Secret	DE Crouter
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An explanation of the data provided routinely to the plants for the performance and recording of charge-discharge operations. These sheets and cards are for interim use until IBM machine changes are completed.

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. FUNCTIONAL ACTIVITIES

A. Production Forecasting, Scheduling, and Analysis

1. Production Forecasting

Two official forecasts were issued during the month; one covered the period May 1, 1957 through September 30, 1958, and the other forecast was for the period May 1, 1957 through June 30, 1962.

2. Production Scheduling

a. Discharge Concentrations

Except for H Reactor, there were no changes in discharge concentrations plans during May. The change at H Reactor involved a slight downward adjustment in connection with the CG-558 outage. This adjustment was minor because of the magnitude of the modified goal discharge plan formerly in effect. Under this plan, 58 percent of the tubes representing 69 percent of the reactor power and 75 percent of the throughput were on a modified goal such that the material discharged from

these tubes averaged about 600 MWD/ton. A slight extra "dig" on the pre-CG-558 discharge resulted in reducing the concentration in the center of the reactor to 500 MWD/ton. The planned reduction in the fringe will take place at the outage following start-up from the CG-558 outage.

b. Enrichment

Five tubes of "C" metal slugs, at 30 "C" and ten depleted slugs per tube, were scheduled and charged into D Reactor to provide needed reactivity for post CG-558 operation.

The E for C slug substitution program at H Reactor was approximately 50 percent complete, with scheduled charging during May of 21 tubes at 32 E slugs and eight depleted slugs per tube and one tube at 30 E and eight depleted slugs. This brought the total E tubes to 87. In addition, one tube of E metal which was nearing goal was discharged and recharged without incident.

Eight tubes loaded with E-N slug charges at B Reactor (four with cored E and four with solid E) were discharged as scheduled by the provisions of the Production Test. Within a few days of this outage, the remainder of the E-N charges (eight solid and eight cored) were discharged due to a rupture in each slug type. The cored material ruptured first (at 843 MWD/ton) and incidentally was a stuck charge; there was one other stuck cored charge and two "reluctant" charges. The exposure of the tube of solid slugs that failed was 780 MWD/ton.

c. Process Tube Replacement

The "problem tube" outage scheduled at F Reactor late in April during the CG-558 testing period was completed in May. In all, 37 problem tubes were returned to service.

A tube outage scheduled at B Reactor resulted in replacement of 90 tubes, including one problem tube.

A tube outage scheduled for the week preceding the H Reactor CG-558 outage resulted in replacement of 75 tubes.

A 60-tube outage scheduled for DR Reactor on May 26 was cancelled when it was decided to use 28 mils as the minimum permissible wall thickness rather than the 30 mils formerly used.

A tube corrosion forecast was completed and issued (HW-50370), assuming a corrosion rate factor double that used in the previous tube replacement forecast (HW-49851) which was issued during April. This was done because of observed trends and indicated rates for slugs being double those in use for tube corrosion work as given in a recent report (HW-44996, In-Reactor Corrosion of Aluminum, dated 2/18/57). This forecast was made

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available to IPD management for use in determining future tube replacement crew needs.

An analysis of process tube corrosion data was completed which factored in evaluation of the effect of tube power on tube corrosion. The results of this analysis have been formalized in report HW-49852 (as listed in Section VI, above).

d. S. S. Allotment Program

A meeting was held with S.S. Accountability, Processing Clerical personnel and Production Scheduling on the S.S. Allotment Program and attendant procedures.

e. Off-Plant Shipments

There were no off-plant shipments from IPD during May.

3. Operations Analysis

a. External Tube Corrosion

A study was made of the external tube corrosion problem at F Reactor. Results and action recommendations were forwarded to F Reactor management in a letter titled "External Corrosion of Recently Installed 100 F Reactor Tubes" dated May 27, 1957, by J. R. Young.

b. Poison Splines for Reactor Control

The appropriation request for poison spline equipment for all reactors was prepared and approved this month. Responsibility for procurement and cost control was assigned to the individual Reactor Operations.

c. Optimum Discharge Frequency

The study was completed and was reported in HW-50095 (listed in Section VI, 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 production data reports were issued to implement the scheduling, forecasting, and S.S. accountability functions of the Production Operation. Charge-discharge and tube replacement information for each Reactor Operation was provided in accordance with production schedules.

During May, the format of the basic IBM tube loading record cards was modified to include additional descriptive and classification data. All of the

information contained in the cards is now "written" and "read" by punched-card machines. The transformation of the 18,464 records proceeded without incident over a two-week interval. For the format change, the necessary planning, machine modifications, machine reprogramming, procedure revision and personnel training sessions were completed. Production data are now available in greater detail and in less time than could be realized with the former records.

C. Reports, Statistics and S. S. Accountability

1. Reports and Statistics

a. Daily Reporting

Routine processing of the Daily Report in both summary and complete forms was continued until May 13, when the complete version was revised to meet a recent change in security requirements. Input production, reactor power level and bulk outlet water temperature data were deleted from the complete report (form 54-5900-017, 1-57), and are being issued separately in code as the "Daily Production Report" (interpreted with Top Secret Key XX-1929). The remaining information on form 54-5900-017 was re-titled the "Daily Operations Report", and is being prepared and issued in accordance with Secret Key HW-47942 REV. IPD Advice 5.3.5 was revised in line with this change.

b. Monthly Reporting

The Combined Report of Production and Reactor Operations for April, 1957 was assembled and issued. Included were the production summary and six pages of statistics prepared by this office. A revised outline was used in preparing the April report.

A Production Summary for May, with explanation for variance from forecast, was prepared for management on May 26, projecting production estimates and experience to month-end. The April summary was supplemented immediately following the April month-end with a statistics sheet showing actual production as percent of forecast, time operated efficiencies, and an outage-hour breakdown by causes.

Special monthly report information was assembled early in the month for personnel of the AEC-HOO (Operations Division) summarizing plant operations and related statistics for April.

c. Production Statistics

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

Room 34 in the 1704-H Building has been designated as the location for the Central IPD Chart Room, when vacated by planned office

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office space reassignments. Preparation for the display of production and related data by Reports & Statistics in wall chart form is continuing. Other components of IPD have been invited to participate.

Other production statistics work performed during May included the following:

- (1) Production data, operating efficiencies, outage hours and tube replacement information were furnished the Product Cost and Budgets Operation.
- (2) Weekly reports showing process water flow and related reactor data were supplied the Radiation Protection and Analytical Laboratories Operations, Hanford Laboratories Operation.
- (3) Information was furnished the Plant & Industrial Engineering Operation each morning showing which reactors were operating.
- (4) Power level, water flow and tube replacement data were given the Process Engineering Operation, Fuel Preparation Department.
- (5) Slug rupture and related data for January through March were compiled for C and H reactors at the request of the Equipment Development Operation.
- (6) Maximum power level and time operated efficiency - overall (1950 to date) was tabulated for D reactor as requested by the D Processing Operation.
- (7) The percent of time during the first four months of 1957 that six reactors and seven reactors were operating concurrently was developed for the Production Forecasting and Scheduling Operation.
- (8) The number of hours each reactor operated during 1956 was developed for the Process Technology Operation.
- (9) Data showing the number of times each K reactor was down for 24 hours or more during 1956 were supplied the Plant & Industrial Engineering Operation.

2. S. S. Accountability

Work was started with the S. S. Accountability Operation on the drafting of an IPD Advice covering S. S. Accountability requirements and procedural responsibilities in the 100 Areas. To date this information has been communicated in various instructional memoranda.

Contact was maintained with the Relations & Utilities Operation relative to the progress of arrangements for the transfer of the 100 Areas S.S. Accountability Unit to the Production Operation of the Irradiation Processing Department.

3. Miscellaneous Services

Field questions regarding authentication and other procedural matters relative to the handling of Top Secret reactor production data continued to require resolution. Clarifying information was obtained from the Security and S. S. Accountability offices, as required.

Assistance was given the D-DR Reactor Operation in complying with the special incident reporting required in connection with the 3X system ball drop at D reactor early in the month.

Miscellaneous administrative functions were performed for the Production Operation, including: (a) consolidation and issuance of the April Monthly Report; (b) arrangements for partition removals in Rooms 32 and 33, Building 1704-H, following the move of two people to Bldg. 1761-H; (c) review of the Minor Funds Budget; (d) determination of current plans and budget provisions for office space in Bldgs 1709-H and 1716-H; and (e) review of IPD Advices and OPG's being issued or revised.

D. Essential Materials

Rail and truck shipments received in May were as follows:

Carload shipments for I.P. Dept.	360
Carload shipments for other Depts.	228
Truck shipments for I.P. Dept.	<u>173</u>
Total shipments received	761

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. The necessary arrangements were made establishing poison splines and Ucon oil (with Y-25 additive) as new items on IPD's list of approved essential materials.
2. Several samples were taken direct from incoming carbon dioxide tank cars. However, results indicated that some air was either trapped in the gas at the top of car, or was being drawn in through a leak in the sampling equipment. If necessary, a liquid sample will be taken from the bottom of the car to insure a representative sample of the material received.
3. Due to the limited availability of helium, it was necessary to request the AEC's traffic office to expedite all helium cars consigned to Hanford so as to avoid any possible delays in transit.
4. Some difficulty has been experienced in obtaining suitably sized filter sand from the present suppliers. Purchasing was requested to obtain samples from other vendors for testing to establish an alternate source of supply.

[Signature]
Manager

Production Operation

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REACTOR OPERATIONS STATISTICS - PROCESSING

MAY, 1957

	B	C	D	DR	F	H.	KE	KW	Total
Input Prod.-Pu(% of Forecast)	91.3	129.8	77.0	92.2	141.2	124.3	96.8	108.1	102.6
Time Oper. Eff. (% Overall)	67.4	54.6	63.8	78.0	40.4	25.3	79.8	87.6	67.1
No. Reactor Outages									
Scheduled	1	1	1	1		1	1	1	7
Unscheduled									
Scrams	5	0	0	6	4	1	2	0	18
Other	4	0	2	4	0	3	4	2	19
Total	10	1	3	11	4	5	7	3	44
Reactor Outage Hours									
Scheduled	159.6	40.0	43.1(1)	51.0	435.9(2)	479.3	39.4	39.5	1287.8
Unscheduled	82.8		226.3	112.8	7.2	76.1	111.2	53.1	669.5
Total	242.4	40.0	269.4	163.8	443.1	555.4	150.6	92.6	1957.3
Breakdown of Outage Hours									Total % of Time
Charge-Discharge	30.0	34.9	28.0	50.2	0	42.1	59.1	39.6	283.9 4.8
Tube Replacement	102.5	0	0	0	8.0	118.0	0	0	228.5 3.8
Project Work	0	0	0	0	431.8	290.0	0	0	721.8 12.1
Production Tests	60.6(3)	3.7	0	1.7	0	0	5.5	0	71.5 1.2
Maintenance	24.8	1.4	13.8	28.1	0	33.1	9.8	113.6	124.6 2.1
Rupture Removal	6.1	0	0.7	47.0	0	14.5	58.3(4)	14.0	140.6 2.4
Leak Testing	14.2	0	0	34.2	0	48.3	0	0	96.7 1.6
Instruments & Circuitry	4.2	0	0	1.8	3.3	0.3	2.3	0	11.9 0.2
Miscellaneous	0	0	2.3	0.8	0	9.1	15.6	25.4	53.2 0.9
Ball Recovery			224.6						224.6 3.8
Total	242.4	40.0	269.4	163.8	443.1	555.4	150.6	92.6	957.3 32.9
No. Slug Rupt. - All Types	3	0	1	3	0	2	4	3	16
Tubes Installed-Repl. Prog.	89				37	76			202
Water Leaks - Tube	2	0	0	2	0	0	1	0	5
Water Leaks - VanStone	0	0	0	0	0	1	0	0	1

(1) Includes 13.5 hrs. for charge-discharge outage continued from April.

(2) Continued CG-558 outage which started 3/26/57.

(3) Includes 35.6 hrs for run-to-ruptures on PT-IP-2A.

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Type Material	Tube No.	Type Rupture	Remov. Hrs.	Charge Date	Rupture Date	Act. Conc.	Lot No.	Removal Method			Remarks
								Quic.	Chg. Mach	Hyd. Jack	
8" Reg.	0782DR	Side hot spot	16.5	11-16-56	5-4-57	441	K-3034				Leaker
8" Reg.	1273DR	unclassified	10.5	1-3-57	5-6-57	375	M-207			X	
8" Reg.	5166 KW	Side hot spot	9.2	3-7-57	5-6-57	384	K-559		X		
8" Reg.	1881-H	Side hot spot	11.8	1-10-57	5-8-57	545	M-249		X		
8" Reg.	1859-H	Split	2.7	1-6-57	5-10-57	449	Y-51	X			
8" Reg.	1969-B	unclassified	18.8	12-26-56	5-11-57	841	PTIP2A				X
1/2" core	1984-KE	Cap failure	9.6	3-6-57	5-11-57	414	D-243		X		
8" Reg.	2570-KE	Not available	31.2	3-28-57	5-13-57	238	K-564				Leaker
8" Reg.	2466-B	Split	6.1	2-3-57	5-15-57	418	Z-260		X		
8" Reg.	4082-D	Cap failure	0.7	11-12-56	5-16-57	470	M-218	X			
8" Reg.	2164-B	Split	16.8	12-26-56	5-17-57	781	-				X
1/2" core	1876-KE	Not available	3.6	3-17-57	5-25-57	449	D-250		X		
8" Reg.	2078-KW	Side hot spot	4.8	3-25-57	5-25-57	350	K-526		X		
8" Reg.	2080-KW	Side hot spot		3-7-57	5-25-57	469	K-550		X		
1/2" core	2881-KE	Split	10.7	3-1-57	5-29-57	537	-		X		
8" Reg.	1783-DR	Side hot spot	20.0	3-20-57	5-31-57	322	2284			X	

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REACTOR OPERATIONS STATISTICS - POWER

SHEET 1

	100-B	100-C	100-D	100-DR	100-F	100-H	100-KE	100-KW	TOTAL
<u>WATER FLOW DATA</u>									
<u>RIVER WATER (BLDG. 181)</u>									
TO RESERVOIR	75960		80960		52452	24718			234090
TO FILTER PLANT	86600		57700				138900	145900	429100
(C, DR, K)									
TOTAL	162560		138660		52452	24718	138900	145900	663190
TOTAL	7256.7		6189.8		2341.5	1103.4	6200.5	6513.0	29604.9
<u>RESERVOIR WATER (BLDG. 182)</u>									
TO FILTER PLANT	62900		71600		47600	23000			
TO COND SYSTEM	3000		8720		4852	1718			
TO EXPORT SYSTEM	10060		640		0	0			
TO EXPORT SYSTEM	10700		10700		-	-			
TO EXPORT SYSTEM	449.1		28.6		-	-			477.7
<u>FILTERED WATER (BLDG. 183)</u>									
TO POWER HOUSE	172		190		115	126	46	15	
TO PROCESS	55900	81300	58700	61600	44668	21700	129900	138900	
TO DR			4990		160	91		50	
TO F & S SYSTEM	133		260						
<u>PROCESS WATER (BLDG. 190)</u>									
TO REACTOR	55500	80900	58300	61200	44268	20600	129500	138500	588768
TOTAL	71200	83500	70600	69400	72442	56100	149700	150700	723642
TOTAL	2477.5	3611.4	2602.5	2732.0	1976.1	919.6	5780.9	6182.6	26282.6
<u>RIVER DATA</u>									
ELEVATION (MSL.FT.)	407.0		395.7		382.6	387.8		402.1	
(MAX)									
(MIN)	390.0		382.1		369.0	374.5		384.4	
(AVG)	401.6		391.2		377.9	383.3		396.8	
TEMPERATURE	50.0		51.7		52.0	51.4		50.8	
AVG °F									

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SECRET

SHEET 2

REACTOR OPERATIONS STATISTICS - POWER

	100-B	100-C	100-D	100-DR	100-F	100-H	100-KE	100-KW	TOTAL
AT BLDG. 182	-		-		-	-			-
BLDG. 183	2807.8	3865.8	3196.2	2575.7	2124.9	1026.7	6200.5	6513.0	28310.6
	-		-		-	-			-
	20447	26470	23280	13280	18440	10430	52000	42200	206547
	0.9	0.8	0.9	0.6	1.0	1.2	1.0	0.8	0.9
	-	-	-	-	-	-			-
	-	-	-	-	-	-			-
							0	0	0
							-	-	-
	271656	293301	275440	194496	256184	128650	510800	700400	2630907
	11.6	9.1	10.3	9.1	14.5	15.0	9.9	12.9	11.1
	360	215	650	350	425	100	900	700	3700
	.015	.007	.024	.016	.024	.012	.017	.013	.016
	186202	279303	133245	92193	90106	42000	270200	205500	1298749
	8.0	8.7	5.0	4.3	5.1	4.9	5.2	3.8	5.5
	36800	62400	41500	42900	31419	13880	87000	93000	408899
	0	1800	0	600	3500	750	0	5900	12550

WATER TREATMENT DATA

MM GALS
MM GALS

CHEMICAL CONSUMPTION

CHLORINE (BLDG. 182) LBS
(BLDG. 183) LBS
AVG PPM

LIME LBS
AVG PPM

CAUSTIC LBS
AVG PPM

ALUM

Sepharon

LBS
AVG PPM

SULPHURIC ACID
(AS 100%)

LBS
AVG PPM

DICHROMATE

PURGE MATERIAL CONSUMPTION

SOLIDS

LBS

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REACTOR OPERATIONS STATISTICS - POWER SHEET 3

ANALYTICAL DATA	100-B	100-C	100-D	100-DR	100-F	100-H	100-KE	100-KW
	100-B	100-C	100-D	100-DR	100-F	100-H	100-KE	100-KW
RAW WATER								
PH	8.00	8.00	7.94	7.93	8.07	8.00	7.79	7.66
IRON	-	-	-	-	-	-	-	-
TURBIDITY	46.0	45.0	54.0	52.0	54.2	51.0	50.0	49.0
FINISHED WATER								
PH	7.00	7.00	6.99	7.01	7.02	7.05	7.02	7.02
IRON	-	-	-	-	-	-	-	-
TURBIDITY	.003	.004	.003	.003	.003	.005	.004	.004
Cl ₂ RESIDUAL	.05	.05	.06	.05	.05	.07	.06	.05
DICHROMATE	1.80	2.00	1.90	1.80	1.89	1.96	1.80	1.80
CHLORIDES	0	0	0	0	0	0	0	0
STEAM DATA	100-B	100-D	100-F	100-H	B.D.F.H. Total	100-KE	100-KW	KE-KW TOTAL
	192000	114000	86000	*178000	570000	95000	80000	175000
	62000	94500	55000	*168000	379500	-	-	-
	82000	92400	67020	65000	306420	39218	30137	69355
	53845	68745	49862	47981	220433	29178	22422	51600
	45660	58296	42284	40688	186928	26260	20180	46440
	5822	5865	5398	4987	-22072	-	-	-
	4091	5410	3963	3361	16847	-	-	-
	24623	21162	19178	22287	87250	-	-	-
	6.60	6.35	6.26	7.14	6.55	-	-	-
	* During normal operating period.							
ELECTRICAL DATA								
OIL RECEIVED								
CONSUMED								
IN STORAGE								
GEN. STEAM/GAL. OF OIL								
TOTAL GENERATED KW HRS.								
1,590,400								3,231,200

ELECTRICAL DATA

TOTAL GENERATED KW HRS.

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REACTOR OPERATIONS STATISTICS - RADIATION MONITORING
MAY, 1957

	B	C	D	DR	F	H	KE	KW	IPD Total
Special Work Permits Issued	27	46	30	25	52	115	25	19	339
Routine and Special Surveys	661	638	751	533	625	524	584	348	4664
Air Samples Taken	105	48	96	48	121	136	39	35	628
Hand Contamination Cases	1	0	1	0	0	0	0	2	4
Skin Contamination Cases	5	2	0	1	0	3	1	2	14
Contaminated Injuries	0	0	0	0	0	0	0	0	0
Vehicles Contaminated	4	3	1	0	0	0	0	0	8
No. Cases Personal Clothing Contamination	2	3	0	4	1	9	6	2	27
No. Cases Contamination Spread Outside Radiation Zones	3	4	0	2	2	2	3	2	18
No. Employees for Whom Dose Rates ≥ 3 Rads/hr. were Established	0	2	1	0	3	1	15	2	24
Lapses of Control (Reactor Operation)	1	0	0	2	2	5	.5	.5	11
No. of Hours Training Others	3	3	12	12	1	50	6	6	93
Attendance at Mtgs for Training Others	25	30	62	63	3	293	27	27	530
REACTOR EFFLUENT DATA									
No. of Effluent Calculations	93	93	120	116	32	79	77	84	
Ave. Beta Dose Rate (mrads/hr.)	15.0	34.3	13.3	22.9	12.4	14.2	33.0	38.3	
Ave. Gamma Dose Rate (mrads/hr.)	21.5	66.2	34.7	29.6	29.5	23.9	60.0	78.1	
Ave. Total Dose Rate (mrads/hr.)	36.5	100.5	48.0	52.5	41.9	38.1	93.0	116.4	
Ave. Integrated Dose in 24 Hrs.	875	2410	1152	1260	1006	915	2232	2710	
Max. Integrated Dose in 24 Hrs. in 1957	1835	4300	2780	3202	1363	3613	4383	4598	

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FACILITIES ENGINEERING OPERATION
MONTHLY RECORD REPORT

MAY, 1957

I. ORGANIZATION AND PERSONNEL

Personnel Statistics

	<u>April 30, 1957</u>	<u>May 31, 1957</u>	<u>Net Change</u>
Employees on Payroll	298	290	-8
Technical Graduates - Rotational	11	10	-1
Technician Trainees	6	6	-0-

The following are changes since the last report period:

	<u>FEO</u>	<u>Tech.-Grad.</u>	<u>Technician Trainees</u>
Payroll Removals	5	-0-	-0-
Transfers into Operation	2	4	-0-
Transfers out of Operation	5	5	-0-

General

EQUIPMENT DEVELOPMENT OPERATION

K. B. Gilbreath, a Technical Graduate - Rotational, transferred in on May 6, 1957.
E. G. Peterson, a Technical Graduate - Rotational, transferred in on May 6, 1957.
D. I. Monnie, a Technical Graduate - Rotational, transferred in on May 6, 1957.

PROJECT ENGINEERING OPERATION

L. F. Hannan transferred to D-DR Reactor Operation on May 15, 1957.
W. W. Lindblom transferred to K Reactor Operation on May 13, 1957.
Patricia A. Buckley terminated on May 31, 1957.
T. O. Brown, a Technical Graduate - Rotational, transferred out on April 29, 1957.

PROCESS DESIGN OPERATION

R. F. Corlett transferred into the operation from Chemical Processing Department on May 15, 1957.
J. J. Reginbal, a Technical Graduate - Rotational, transferred in on May 13, 1957.
E. T. O'Sullivan is on leave of absence effective May 16, 1957.
Bonnie Merrill is on pregnancy leave effective May 3, 1957

Susan Olson is on pregnancy leave effective May 31, 1957.
J. C. Peden, a Technical Graduate - Rotational, transferred out on May 20, 1957.
W. A. Massena, a Technical Graduate - Rotational, transferred out on May 6, 1957.
F. J. Kempf, a Technical Graduate - Rotational, transferred out on May 1, 1957.

PLANT AND INDUSTRIAL ENGINEERING OPERATION

J. R. Mitzlaff, a Technical Graduate - Rotational, transferred out on May 6, 1957.
H. D. Lenkersdorfer entered military service on May 1, 1957.

ENGINEERING AUXILIARIES OPERATION

J. L. Rusk transferred to the Financial Operation on May 20, 1957.
Elinor G. Ludlow transferred to the Financial Operation on May 20, 1957.

PROJECT MAINTENANCE OPERATION

L. L. Fillion transferred in from D Reactor Operation on May 6, 1957.
C. E. Hinson transferred to D Reactor Operation on May 6, 1957.

Trips and Visitations

J. R. Carrell, D. L. Condotta and W. J. Morris visited the Hydraulics Research Laboratory of Washington State College at Pullman, Washington, to determine progress on the water-wall flow model tests and to discuss experimental results obtained thus far.

W. W. Windsheimer visited Manufacturing Services in Schenectady, and attended the SAM-ASME Conference in New York City.

As part of the assignment of reporting on Columbia River flow conditions, H. A. Kramer attended a meeting with the Corps of Engineers and AEC personnel in Seattle, Washington, on May 16, 1957.

R. L. Roy attended the Northwest Instrument and Automation Exhibit at Seattle, Washington, on May 9 and 10, 1957, to contact vendors on 100 Area instrument problems.

Mr. William L. Shannon of Shannon and Wilson, Soil Mechanics and Foundation Engineers, Seattle, Washington, visited 105-DR at the request of Utilities Engineering Operation to appraise the condition of the building.

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J. L. Michaelson from General Engineering Laboratory visited on May 20, 1957, and in a general meeting presented a speech supplemented with picture slides on the work of GEL. Afterwards, he was consulted by the Equipment Development manager and supervisors on specific equipment development problems.

Hugh. W. Bellas and Dale Babcock of E. I. DuPont DeNemours and Company, Wilmington, Delaware, visited on May 14, 1957, to discuss problems associated with our water pump system.

R. D. Schilling visited Instrument Laboratories and Woodland Electric in Seattle, Washington, on May 8 - 10, 1957, for engineering consultation purposes. Also, while in Seattle, he attended the Instrument Vendor Show and picked up a B-29 Astradome Blister from Spencer Aircraft.

J. W. Green attended the Non-destructive Testing Symposium in Chicago, Illinois, and visited Fairchild Instrument and Camera Corporation, and Anton Instrument Company on April 13 - 27, 1957, to inspect a prototype transistorized sub-critical level and period meter system similar to one they have just started to make up for HAPC.

R. Sherrard visited Panellit in Skokie, Illinois, General Electric Laboratory and Atomic Products Division in Schenectady, New York, Lewis Engineering in Nantucket, Connecticut, and Arthur C. Ruge Associates in Cambridge, Massachusetts, on April 12 - 30, 1957, in support of Project CG-666, and consultation on further development of process tube temperature high limit devices, review of work in progress on prototype resistance thermometer bulbs, and review on prototype strap-on resistance-type temperature bulbs.

Training

B. K. Ferris and M. W. Silver attended the Irradiation Processing Department's Radiation Protection training course.

J. E. Boyd and J. M. Goff attended the Irradiation Processing Department Employee Benefit Plans training course.

C. P. Cabell attended the General Electric Salary Plan and it's Administration class, sponsored by Personnel Development and Communications Operation.

J. P. Corley attended the Data Processing training class, sponsored by Personnel Development and Communications Operation.

R. W. Powell attended the Consolidated Electrodynamics Corporation Exhibit of data processing equipment in Richland.

J. W. McLaughlin attended a four-hour training session on Process Orientation sponsored by Personnel Development and Communications Operation.

E. C. Arbuckle, B. C. Benedictson and D. B. Hagen attended a course on Programming Scientific Problems on the 650 Computer presented by the Data Processing Operation of Relations and Utilities.

All clerical personnel had an opportunity to attend a Security Information Meeting sponsored by Personnel Development and Communications Operation for the purpose of discussing the revised issue of "Confidentially Yours."

M. L. Faught spoke to Electrical Engineers on the Technical Graduate program, on Plant Engineering work responsibilities and examples of current electrical engineering assignments, at the request of R. W. McCullugh of Personnel Development and Communications Operation.

Safety

There were nine medical treatment injuries incurred during this report period.

II. PROCESS DESIGN OPERATION

Existing Reactor Studies

The Plant and Equipment Analysis Report on the proposed "K" water plant modification work was approved and issued during the month. Initiation of project proposal preparation has been requested. An informal pump model testing program proposal was received from the vendor with an estimated cost of \$75,000. A four-month high-flow test of one of the existing "K" plant high lift pumps was completed and the pump was inspected. Results indicate several years minimum useful impeller life at 31,500 gpm but that a redesigned impeller will be required to attain 35,000 gpm per pump.

Design development for a unitized rear nozzle assembly suitable for continuous charging system use is 40 percent complete. This assembly collects all water, hydraulic and thermocouple connections into one quick-disconnect flange to permit reduction in maintenance exposure time to a minimum.

A study report has been prepared and will be issued shortly describing a revised design approach for Ball 3X Recovery System improvement to reduce reactor outage time and to eliminate the high radiation exposure now experienced during this operation. The method under consideration may be attainable for a cost of about \$1,500,000, compared to previous estimates of over four million dollars. Economic justification is probable at the revised cost. Preparation of a Plant and Equipment Analysis Report has been initiated.

New Reactor Studies

Work on the preliminary evaluation of an organic-cooled, graphite-moderated power reactor meeting the functional criteria of the Hanford Power Reactor Study request received from the Atomic Energy Commission in January has been completed and a summary report prepared for transmittal to the requester. The reactor concept chosen for cost evaluation has

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nine hundred and one horizontal process tubes of 2.9 inch I. D. in an 8 x 8 inch square lattice array. A wide variety of fuel geometries and cladding materials are applicable but for the reference case a seven-element steel clad uranium oxide cluster was chosen, along with 100 mil wall steel process tubes.

The cost data developed do not compare as favorably with the water-cooled case previously studied and reported in HW-48481 as had been hoped:

	Organic, 1958		Water, 1958	
	Government	Private	Government	Private
Base Cost	\$ 74.4x10 ⁶	\$ 78.6x10 ⁶	\$ 73.6x10 ⁶	\$ 77.6x10 ⁶
Total Capital Cost	91.0x10 ⁶	109.0x10 ⁶	87.2x10 ⁶	105.0x10 ⁶
Cost per MW Heat	91	109	87	105
Cost per MW Net Elec.	285	355	300	370
Unit Product Cost (mils/kwh)				
Fuel		3.42		2.63
Operation and Maintenance		.79		.58
Capital		8.76		9.16
Total		12.97 mils/kwh		12.37 mils/kwh

The general conclusion is that the organic-cooled case has a significant advantage in the relative assurance of freedom from fuel rupture problems for a variety of fuel element designs and that it has the potential for economically competitive capital and unit power costs. However, until more data are available, it is not possible to show this by conceptual studies of the type reported here.

Other new reactor studies carried on during the month included process coolant manifolding development and test, application of organic coolants to production reactor design, high temperature reactor plant component development, and preliminary consideration of gas-cooled graphite-moderated reactor concepts.

Project Design Activities

CG-558 - Reactor Plant Modifications for Increased Production

During initial operation, following completion of the F Area shutdown, it was found that the design of the effluent line entrance into the retention basin would not allow full flow operation without overflow of the inlet box. This difficulty was corrected by the addition of splash plates. During this same period of operation, effluent water overflowed the top of the downcomer. The increased water level in the downcomer, due to the higher flow rate, had caused an overflow through the cross-over neoprene seal which had deteriorated since initial installation of the downcomer. The neoprene was replaced with a new "Hypolon" seal which should resist deterioration from radiation and heat for an extended period of time. Also, a number of holes were cut in the top tray of the downcomer to reduce the water level on the seal. It has been verified that momentarily excessive downcomer water levels occur during a sudden increase in process water flow from shutdown rates to normal flow. A recommended maximum rate of

water flow increase was calculated for use by the operating groups. The controlled rate of increase will not place any undue restriction on plant operation.

Work on the process pump cavitation problems continued. During the month a performance test was made on an F pump having modified wear rings and a modified first stage impeller.

It has been concluded that a permanent pump test stand could not be completed in time for testing of the final impeller design for the 190 pumps. Steps are being taken to do this testing in the operating plants.

The head-capacity curve agreed with the vendor's extrapolated half-speed test data and with the results of previous tests of an unmodified pump at 190-B.

A review has been made of the CG-558 economic justification based on current cost and operational data. Results are reported in HW-49798.

Contact with the 183 pump vendor indicates that an impeller design modification has been developed which they feel may correct the cavitation condition noted in these pumps during initial operation. To provide a basis for evaluation of the proposed modification, all available information on the present design is being gathered for transmittal to our pump consultant, along with the vendor's proposal.

CG-708, Additional VSR's, KE and KW

All mechanical detail design drawings have been approved and issued for construction. Purchase orders for all major items of equipment have been placed with the vendors. Electrical detail design drawings are being corrected to incorporate comments received at which time detail design on this project will be essentially complete.

CG-709, Improved VSR's, All Areas

Mechanical preliminary design drawings are essentially complete and electrical preliminary design drawings are in preparation. Procurement of materials and equipment for prototype fabrication and development testing has started. An outline of the proposed testing program has been completed and published in HW-48845.

Significant Reports Issued

HW-48845	"Development Program for Air Accelerated Vertical Safety Rods for Project CG-708 and CG-709," May 13, 1957.	G. E. Wade
HW-49509	"Plant and Equipment Analysis Report, K Reactor Water Plant Capacity Expansion," May 2, 1957.	M. H. Schack E. O'Sullivan
HW-49789	"Current Economic Bases for Project CG-558," May 2, 1957.	D. L. Condotta

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HW-49853	"Operating Conditions for In-Service Test of CG-600 Process Pump, Serial Number 320268," April 29, 1957.	M. H. Schack
HW-50080	"Proposed Elimination of K Area VSR Gas Seals," May 7, 1957.	G. E. Wade F. J. Kempf
HW-50178	"Calculation of Justification for Coincident Trip Start-up Instrumentation, Project CG-654, J. Plant," May 2, 1957.	D. B. Lovett
HW-59197	"A Concise Form of the Equilibrium Xenon Equation for Any Slug and Pile Design," May 14, 1957.	E. R. Astley C. A. Mansius
HW-50201 RD	"Moderator Placement Problems in Large Reactors," May 15, 1957.	D. Marinos
HW-50237	"Shutdown Transients for Xenon and Iodine for any Slug and Pile Design," May 17, 1957.	C. A. Mansius
HW-50308	"Performance Test of CG-558 Annex Pumps with Modified First Stage Impeller and Wear Rings," May 27, 1957.	M. H. Schack
HW-50359	"Hanford Power Reactor Study, Supplementary Report, Organic-cooled Case," May 27, 1957.	A. B. Carson Staff of Process Design Operation
	"Trip Report to Bingham Pump Company," May 9, 1957.	H. W. Heacock

III. EQUIPMENT DEVELOPMENT OPERATION

General

To reduce rear-face manpower and exposure requirements in the tube replacement program, balance-mounted power tools were procured and demonstrated to Central Maintenance personnel. These tools are sufficiently attractive that Central Maintenance will seek early evaluation on H Pile. Tools demonstrated include (a) an impact wrench with torque control for nozzle removal, (b) a jack-bolt-hole thread chaser, (c) a pigtail cutter, (d) a ratchet wrench for tubing connectors, and (e) a high-pressure jack. These tools may be balanced for use from an overhead monorail.

Process-tube ribs were successfully reduced twenty mils for the I and E slug program, employing a milling cutter powered by a small air motor which fits inside the tube. Techniques for moving the cutter into and from a tube in the pile and for disposal of chips are being worked out with Central Maintenance and C Reactor Processing personnel in preparation for an on-pile demonstration in July.

A prototype installation of a poison column system wherein the poison is supported on a cable attached to the front face of the pile and can be moved into or out of the active zone using an electric motor winch was installed on DR Reactor on May 29, 1957. The installation consists of thirty pierced Li-Al slugs for by-product production, the cable, the electric motor-winch, a control panel, and a position-indicating meter. Operation to date has been satisfactory but information is still preliminary.

Materials development centered on VSR materials, protective coatings to prevent sulfuric acid damage to water basins, joint seals in the effluent basins, seal for the F Area downcomer, polyethylene for cable insulations, insulation for zone temperature monitoring leads, and radiation-resistant duct cement.

A Plant and Equipment Analysis Report for improved reactor gas instrumentation was completed indicating a pay-off period of less than one year and providing greater assurance of reactor life. Design criteria for this project is nearing completion.

In the intentionally-cocked-slug program, all twenty-four cocked slugs have been discharged with exposures ranging upward to 600 MWD/T without any evidence of rupturing. Examination of a process tube at a cocked slug showed "hot-spot" corrosion of approximately three mils. This test indicates the marginal effects of slug cocking but the data must be qualified for future operations since (a) exposures were relatively low, (b) tube power levels were relatively low, and (c) most of the slugs were intentionally cocked only at the end of a column, not at the center of the tube. Possible extension of the tests is being studied.

Significant Reports Issued

HW-49030	Design Criteria - Slug Saw and Etch Facility, 105-C Building, Project CG-689, March 11, 1957.	P. B. McCarthy
HW-49818	Tube Sleeve Deflection Test, Project CG-654, April 26, 1957.	S. O. Arneson J. H. Fastabend
HW-50094	Performance Test of a Large Air Circuit Breaker as a Replacement for IXX and RDX Relays, April 29, 1957.	D. T. Thonn
HW-40223	CG-558 Electrical System Analysis, May 15, 1957.	W. Dalos
None	Supplement "C" PT-105-618-A IP-12-AE Poison Spline Flexible Control System, April 24, 1957.	P. B. McCarthy G. J. Rogers
None	Problem Assignment No. I-1, Revision 0, Fuel Rupture Detection, April 14, 1957.	A. G. Dunbar
None	Project CG-705, Rod Cooling Water Instrumen- tation Reports: Plant and Equipment Analysis Report,	J. D. McCullough

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April 16, 1957
Design Criteria - April 17, 1957

IV. PLANT AND INDUSTRIAL ENGINEERING OPERATION

The drafting backlog of new work is increasing and efforts during the month to subcontract work to all other HAPO Drafting Operations have been unsuccessful. Approval of the proposed contract for obtaining off-site draftsmen has been delayed, pending additional review of budgets.

One hundred sixty-three suggestions were received during the month. Evaluations were completed on 183 suggestions. At month end a total of 351 suggestions were awaiting completion, as compared with 371 suggestions at the end of April.

The entire April 25-26, 1957, charge-discharge outage at 105-KW was photographed on motion picture film. Over 3,500 feet of film was shot covering all phases of the operation. The film has been developed, edited and documented. The analysis phase has begun.

Work was initiated on formulating a program to review all Irradiation Processing Department Cost Standards, and to convert as many as possible of the "past-practice" cost standards to engineered standards.

The Standards Engineering Operation moved to new quarters in the Instrument warehouse in White Bluffs on May 23, 1957, thus consolidating all functions of the Operation.

A complete survey of the painting requirements for all Irradiation Processing Department facilities has been made by the 100 Area painting supervisor under the guidance of the Productive Maintenance Engineer.

The detail instrument plans have been completed for rear face thermocouple replacement at 105-H Building.

A review of Operations Spares, Caption "E" (electric motors) was initiated with special emphasis being placed on deleting parts obsoleted by CG-558, correcting nomenclature, and better identification of the parts with specific equipment.

Only minor progress in finding the leaks responsible for backfill settlement of 105-DR Building was made. An examination of the far downcomer shows cracks in the vertical angles near the bottom, and the near downcomer continues to drain from the space between the downcomer and building. Investigation is continuing to obtain information for scoping the repair program.

Significant Reports Issued

Work Simplification Program IV, Study 57-9, April 29, 1957.

D. B. Hagen

Trip Report, Meeting with Corps of Engineers, May 22, 1957.

H. A. Kramer

V. PROJECT ENGINEERING OPERATIONGeneral

During the past month Project Engineering has managed or participated in forty-nine projects and engineering studies. The total funds authorized to General Electric on the active phases of projects in progress during this report period are approximately \$70,000,000.

Engineering Inspection services are being performed on eight projects and on work orders issued by Research and Engineering and 100-B Area Maintenance.

Material Control functions were performed for Facilities Engineering and Reactor Operations as follows:

	<u>Proj. Engr.</u>	<u>Equip. Devel.</u>	<u>Process Design</u>	<u>Reactor Opr. All Areas</u>	<u>Total</u>
Purchase Requests Handled	39	26	3	* 2	70
Requisitions Issued (including alterations)	37	23	3	2	65
Store Orders Issued	2	3			5
Dollar Value of Business	\$57,766	\$1500	\$1685	\$113,400	\$173,351

* This service for the Reactor Managers is being performed on work order basis.

Construction Projects

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

<u>Project Number</u>	<u>Title</u>	<u>Completion Scheduled*</u>	<u>Actual</u>
CA-512	100-K Area Facilities, Revisions 3, 4, and 5	100	100**
CA-512	1706-KER Recirculation Facilities	100	100
CG-558-I	Reactor Plant Modifications	98	99
CG-558-II	Reactor Plant Modifications	86	90
CG-600	100-C Alterations	96	45
CG-654	Advance Reactor Design	--	97

* Per Certified Schedule or Directive Completion Date.

** Complete with exceptions.

CA-512 - 100-K Area Facilities

This project is being closed out with five exceptions.

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CG-558 - Reactor Plant Modifications for Increased Production

The authorized funds for Phase II have been increased by \$2,300,000 making the total authorized funds \$13,500,000. This is \$300,000 less than the project proposal submitted by General Electric to the Atomic Energy Commission. A project proposal revision has been submitted on Phase I, requesting an increase of \$400,000, which would make the total funds requested for authorization in Phase I \$26,300,000.

Phase I work for 100-B, DR, and D Areas is approaching completion, the major activity being modification of 190 pumps and cleanup of the punch list work items. Pump modifications have been completed in 190-D and on all but one unit in 190-DR. Three units have been completed in 190-B and the fourth is in the process of modification. The orifice type bypasses are being installed in 190-B concurrently with the pump modifications.

During the month the stator on 190 pump drive motor unit No. 6 had a coil failure. The stator was removed and sent to General Electric Service Shop in Seattle for repair. During the repair, the stator will be completely checked and the rewedging of coils required to put the unit in an as-new condition will be accomplished.

Cavitation problems exist on all of the 183 Building pumps supplied by DeLaval Company. Drawings showing modifications suggested by DeLaval were sent from Trenton on May 23.

The F outage was completed on May 17.

The official date of the CG-558 shutdown at H was May 20. Work in the water plant was started on May 13. Work is proceeding on schedule. Extensive piping changes are being made in the 190 Annex to install orifice-type bypasses and to modify the angle of entry of water from the individual pumps into the 24-inch headers.

CG-600 - 100-C Alterations

One of the pumps supplied by Byron-Jackson is installed in position No. 12 at 190-C. It has had approximately 20 days of operating time since installation, and is scheduled for examination in early June. The purpose of this operational test is to determine the extent of cavitation damage under normal operating conditions.

Work was held up on the east effluent line due to reassignment of craft forces to 100-H outage work.

CG-651 - Continuous Charge-Discharge Demonstration Unit - 105-C

This job is slightly ahead of schedule. The work remaining consists of installation of the rear face and front face ball valves. This work is scheduled to be accomplished during a week's outage starting on July 8. The revised project proposal requesting additional funds is scheduled for final Irradiation Processing Department approval on June 10, 1957.

CG-663 - Steam Driven Auxiliaries

Fixed-price contractor bids were opened on May 15. Notice of Award has been issued.

Project CG-666 - Zone Temperature Monitoring - 105-B, C, D, DR, F, and H Areas

One phase of this project includes the installation of resistance temperature detectors and their three-conductor signal cables leading from the RTD's to the console. The cable was installed at 100-B, D, and DR, with apparent success. At 100-F and H Areas, however, it was found that the plastic coated cover, not bonded to the conductors, had slipped off and was torn during installation, particularly at F. This installation work was being done in conjunction with the CG-558 outage. It has been stopped at H Area. It is planned that when a suitable protected cable has been developed, it will be installed at H Area during future scheduled or unscheduled outages. It may be necessary to replace the installation at F Area and possibly the others. A prototype controller, manufactured by Panellit, Incorporated, was received on plant site approximately May 20, 1957, and is being tested now at the 300 Area.

CG-669 - Water and Gas Leak Locating Equipment - All 100 Areas

This work is being done by plant forces and has been delayed periodically due to manpower requirements for high priority work.

CG-694 - Auxiliary Oil Pumps - 190-C

This project is being rescoped to reduce the content of the job from the presently authorized funds of \$80,000 to approximately \$20,000. This work is planned for performance with the CG-600 pump installation.

CA-702 - Relocation of Dormitories to 100-H Area

This work is now essentially complete within the authorized funds.

CG-708 - Installation of Additional VSR's, KE and KW

Orders for all critical material have been placed. Work orders have been issued to Project Maintenance and preliminary planning is underway.

CG-743 - Ventilation Improvements - 165 and 190-KE and KW

A work release for design was issued on May 8, 1957. A request for negotiation of a construction contract to start installation of the roof opening in the 165 Building was sent to the Atomic Energy Commission May 24, 1957.

AEC-160 - Recirculating Gas-Cooled Test Loop

Drawings have been issued to the Atomic Energy Commission, Army Reactors Branch, in Washington, D. C., for their review and approval. A Work Authority in the amount of \$250,000 has been received.

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VI. PRINCIPAL ENGINEERS

Project CG-558 Fault and Operational tests for 100-H Area have been planned and will include tests of the underpower auxiliary relays added as a result of D-DR Area testing.

The new, more liberal HAPO Noise Criteria has now been approved formally by the Atomic Energy Commission and will permit immediate development of the project proposal pertaining to the installation of acoustic materials and noise reducing devices in 100-B, D, and K Areas.

Examination of a drained 107-A tank in 100-KE by the Principal Metallurgical Engineer shows the bottom of the tank to have adjusted stress by establishing pressure ridges. These are, in effect, expansion joints and when drilled showed no excessive corrosion at ridge or fillet.

Three batches of K VSR sections have been stress relieved at 200 East shops. The total run-out has been small; maximum deviation eighty-thousandths on one section. One further batch of sections will be stress relieved at 1,350 F and the warp measured. Subsequent analysis of results will indicate whether or not heat treating will be required for in-service as well as new K VSR's.

VII. ENGINEERING AUXILIARIES OPERATION

Project Proposals Submitted to the Atomic Energy Commission

CG-558 Reactor Plant Modifications for Increased Production
Phase I
Rev. 6

CG-674 Water Plant Component Test Loop - Building 1706-KE
Rev. 1

CA-735 Lunch and Locker Room Improvements - 100-B, D, and F Areas
Rev. 1

CA-751 Steam Line Support Pole Replacement - 100-B, D, and F Areas -
Phase III

CG-755 Organic Analytical and Hot Loop Facility - 1706-KE

Project Proposals Approved by the Atomic Energy Commission

CG-558 Reactor Plant Modifications for Increased Production - 100-F
Ph. II and H Areas
Rev. 2

CG-743 Ventilation Improvements - 165 and 190-KE and KW

CA-751 Steam Line Support Pole Replacement - 100-B, D, and F Areas-
Phase III (Design Only)

Proposal Preparation Requests Received

CG-663 Steam Driven Auxiliaries - Buildings 165-KE and KW
Rev. 1

CG-705 Rod Cooling Water Modifications
Rev. 1

100-K Water Plant Expansion - Preliminary Design

General

The K history was issued May 2. Work was begun on Volume II, the C. T. Main Water Plant history, which is scheduled for publication in July.

Much consideration has been afforded the proper classification of project connected Architect-Engineer-Management services and the application of descriptive terminology which, if adopted, will result in more appropriate estimating and cost recording of the broad area of effort presently collected under the term "field engineering". The planning and organizing effort is being directed toward the separation of those services which under a normal commercial operation would be considered as ownership responsibility, architect-engineer responsibility, and construction management responsibility. These expenses will continue to be funded from project funds, but will be separately established in estimating so that each element may be more reasonable and compare to it's commercial counterpart.

Significant Reports Issued

Post Completion Report on Project CG-579 - Effluent Water Monitoring Improvements - 100-C Area

VIII. PROJECT MAINTENANCE OPERATIONWork Order Data

	<u>April</u>	<u>May</u>
Active work orders	59	66
FEO orders to Maintenance (except shop)	43,000.	105,432.*
Unexpended labor dollars	\$ 731,000.	\$ 522,765.**

* Previous months included only that work which Project Maintenance transferred to Maintenance organizations at their request. This months' figures includes all authorized funded dollars issued to Maintenance organizations, except Central Maintenance, by Facilities Engineering Operation.

** The primary reason for the approximate \$200,000 decrease is explained by the following:

Completion of Project CG-622 - underrun.
Completion of thermocouple installation in "D" - underrun.
Downward revision of CG-558 work orders for Panellit gauges.
Several more miscellaneous project work orders were underrun.

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General

Overtime expenditures continue to run about nine percent during the current 100-H Area outage.

A complete small tools inventory was completed this month.

For W. W. McIntosh
Manager
Facilities Engineering Operation

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

<u>INVENTOR</u>	<u>SUBJECT</u>	<u>REPORT OF INVENTIONS</u>
G. A. Newell and J. R. Carrell	Quick Acting, Water-Cooled, Hydraulic Activated Control Rods	May 27, 1957
D. F. Bolender J. C. Dahlin	Remotely-Operated Nuclear Reactor Table Closure Equipment	May 15, 1957

PERIOD COVERED BY THIS REPORT May, 1957

for Manager
Facilities Engineering

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EMPLOYEE RELATIONS OPERATION

May 1957

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PERSONNEL DEVELOPMENT & COMMUNICATION OPERATION

General

The Personnel Development & Communication Operation has been reorganized into the Personnel Development & Placement Operation. Changes which occurred under this reorganization include, addition of the Technical Placement, Employment and Mail and Duplicating to the Personnel Development and Training function; and dropping the Communication function. The latter operates as an independent function. For record and budget reasons the force figures are being included under the former organizational categories until the end of the fiscal year. The force temporarily increased from seven to eight when a General Clerk "C" returned to duties after a medical leave of absence. This clerk was transferred to the Personnel Practices Operation by the end of the month. The static force of seven includes four exempt and three non-exempt personnel. No loss time or security violations occurred.

Communication Activities

Mass communication activities included the publication of five Management News Bulletins and five Union Relations Information bulletins, and distribution of one health bulletin and two issues of Management Information for Foremen and Supervisors. The General Manager held one Management Information Meeting during May.

An IPD News Letter, signed by the General Manager, was distributed to all IPD employees. The letter congratulated employees on the current safety performance and notified them of the three honors received by the department for that performance.

The Communication Specialist is giving a two-hour course on communication to the managers and supervisors of the B-C Reactor Operation as part of their Management Development Program. The first of five meetings was given during the month.

As a result of a survey of all IPD Operations, distribution of the GE REVIEW was trimmed from 288 copies to 157 copies. This reduction was made as a result of a request from the Editor to reduce distribution if at all possible.

GE NEWS coverage included two feature stories: the first on the 100-B-C Reactor Operation's Power Operation; the second on the work sampling program currently underway within IPD.

An indication of the extent to which the GE NEWS is utilized as a medium may be obtained from the following tabulations:

	<u>This Month</u>	<u>Last Month</u>	<u>Year to Date</u>
<u>Photos</u>			
No. Published	23	17	115
Column Inches	250	174	1225
Text - Column Inches	48	9	173
Total - Column Inches	298	183	1398

Two papers prepared by IPD employees were processed for Public Relations review and approval:

"The General Electric Company's Intensive Interview Program	-	R. E. Anderson
"Reactor Dynamics and Control"	-	J. H. Brown

Personnel Development Activities

Nine requests for candidates to fill position vacancies were processed after level 3 and 4 managers were notified by letter that the Manpower Register was ready for service. This makes a total of fourteen position vacancies processed by the register since April 15, 1957. Fifteen hundred copies of a four-page personal questionnaire, designed to obtain additional information for the Manpower Register, were prepared and copies sent to all IPD exempt personnel.

Forecasts for nineteen short-term, unclassified technical graduate assignments have been received in answer to a letter to level 3 managers. These assignments stem from a request from the tech. grad. program supervisor to obtain any beneficial employment for the new tech. grads. while they await their "Q" clearances. An Advice outlining general ground rules for the technical graduate program was received from R & U. A related Advice for IPD is in progress. The first trainee of the Western Circuit - Engineering Program was assigned to IPD-R & E. Three technician trainees were rotated within the department during the month. The monthly tech. grad. availability and status report was distributed to all appropriate level 3 and 4 managers. An addressograph list of these managers was sent to the program supervisor so that direct mailing can be carried out in the future.

The present status of the tech. grad. assignments by Operation is as follows:

<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.	7	6	17	1	6
Facilities Engrg.	4	4	14	0	5
B-C Reactor	0	1	1	0	0
D-DR Reactor	1	0	2	0	1
F-Reactor	0	0	0	0	0
H-Reactor	0	0	0	0	1
K-Reactor	2	0	1	0	2
Totals	14	12	35	1	15

The four PBM-I classes have satisfactorily completed the twenty session course. Sixty-six exempt employees received certificates at a group meeting on May 16.

Exempt employee training classes have continued on schedule.

Individual class progress and attendance in the current quarter's Exempt Employee Training Program is shown in the following table:

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	<u>This Month</u>	<u>Last Month</u>	<u>Year to Date</u>
Management Orientation	8	0	22
G.E. Salary Plan & Its Administration in the IPD	15	0	27
Financial Operation Orientation	0	0	12
IPD Radiation Protection Program	15	15	12
Effective Business Writing	0	18	11
GE Employee Benefit Plans	0	21	43
Labor-Management Relations	24	0	42
Process Orientation	18	0	36
Safety and Fire Prevention	6	0	18
Time Card Procedures	4	96	100
Data Processing	7	10	25

The twelve-hour survey course, "Understanding People" conducted by Dr. J. C. Conant in 100-D Area was completed. Due to the favorable feedback, plans have been made for Dr. Conant to start three new classes in other areas as soon as scheduling can be arranged.

The fifth and final clerical information meeting on the new issue of "Confidentially Yours" was held this month. Approximately 17 people attended.

The Non-exempt Personnel Development Program experienced normal activity during the past month. Program progress is shown in the following tabulation:

	<u>This Month</u>	<u>Year to Date</u>
Number of forms distributed:	116	632
Number of forms Returned	97	447

There was pronounced activity in the Supervisory Selection Program for May. There was a greater amount of re-evaluations to be performed than usual which limited time for new evaluations.

	<u>This Month</u>	<u>Last Month</u>	<u>Year to Date</u>
New evaluations completed	2	3	8
Evaluations underway but incomplete	7	6	
Re-evaluations performed	11	5	77
Re-evaluations underway but incomplete	4	10	
Re-evaluations outstanding	3	5	
Nominations outstanding	40	42	
Appointments from the Program	0	0	2

HEALTH & SAFETY

Personnel

Employees: Exempt - 4. Non-exempt - 1.

Accident Statistics

	<u>May 1957</u>	<u>Year to Date</u>
Disabling Injuries	0	0
Frequency	0	0
Severity	0	0
Medical Treatment Injuries	105	506
Frequency	2.22	2.40
Accumulated hours of exposure since last Disabling Injury (10-17-56)	3,096,532	

Fire Statistics

Fires	0	1
Losses	0	0

Security Violations

Research & Engineering	2	8
Facilities Engineering	1	4
B Area	0	1
H Area	0	1
K Area	0	1
F Area	1	1
Total	4	16

The Award of Honor plaque was received from the National Safety Council on 5-29-57. This award is the highest recognition bestowed by this Council for safety performance.

The AEC - HOO Safety Division recognize this achievement and are preparing either a letter or plaque to commemorate this occasion.

On May 30, 1957, IPD achieved the second award under the terms of the Safety Award Plan having operated 225 consecutive calendar days without a disabling injury.

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PERSONNEL PRACTICES

General

The Personnel Practices Operation has now been dissolved, the Manager becoming Specialist - Employee Relations with responsibility for studying, evaluating, and measuring progress of the IPD Employee Relations program; the Technical Placement, Employment, and Mail and Duplicating functions being assigned to the Personnel Development and Placement Operation; and the Employee Benefits and Services functions being assigned to Employee Compensation.

FORCE

(Note: For the sake of uniformity, force figures are being listed under the former organizational categories until the end of the fiscal year.)

	<u>Beginning of Month</u>	<u>End of Month</u>	<u>Net Change</u>
Exempt	6	6	0
Non-Exempt	<u>15</u>	<u>18</u>	<u>+ 3</u>
	21	24	<u>+ 3</u>

One Secretary was transferred from IPD General; one General Clerk "C" was transferred from Personnel Development and Placement; and one Motor Messenger was hired in anticipation of an impending termination.

Technical Personnel Placement

1. PhD Activity

Five PhD candidates were interviewed by IPD representatives this month, resulting in two employment offers. Both joint offers. We have received our second PhD acceptance which was a joint offer with HLO. His placement in IPD or HLO will be determined when he arrives for employment.

2. BS-MS Recruitment (Experienced)

	<u>May</u>	<u>April</u>
Active Cases Centralized by IPD	5	10
Candidated Centralized by other Depts.	12	8
Offer Letters Processed	0	1
IPD Offers Accepted	0	1
IPD Offers Rejected	0	1
Offers Candidates Considering	1	1
New Hires - IPD	1	0

IPD active participation in Experienced BS-MS recruitment has been curtailed due to the importance of placing people from our FEO availability list.

3. Transfers and Terminations

	<u>May</u>	<u>April</u>
Active Cases Within IPD	17	17
IPD Interest From Other Depts.	4	7
Transfers, Other Depts. to IPD	1	2
Transfers, From IPD to Other Depts.	0	0
IPD Transfers to Other GE Sites	1	1
Terminations	4	2

Two employees left on leave to the Armed Forces, another terminated on leave of absence to the AEC. The other termination was to accept an HOO-AEC offer.

4. Military Reactivates

One Service Reactivate reported for re-employment on 5-5-57. We have one outstanding offer and are establishing communications with four other Service employees.

Employment

1. Employee Service Recognition Plan

<u>Years of Service</u>	<u>Number of Awards</u>	
	<u>This Month</u>	<u>9-1-56 to Date</u>
5	15	150
10	25	125
15	1	2
20	0	0
25	0	0

2. Attendance Recognition Plan

<u>Years of Perfect Attendance</u>	<u>Number of Awards</u>	
	<u>This Month</u>	<u>9-1-56 to Date</u>
1	4	103
2	10	91
3	4	64
4	6	42
5	7	41
6	3	18
7	0	8
	<u>34</u>	<u>367</u>

3. Requests For Transfer

	<u>Non-Unit</u>	<u>Unit</u>	<u>Total</u>
On Hand 4-15-57	4	27	31
New Requests Received	4	1	5
Transfers Completed	2	1	3
Requests Cancelled	0	0	0
Interviews Conducted	1	0	1
Requests on Hand 5-15-57	<u>6</u>	<u>27</u>	<u>33</u>

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4. Personnel Changes, 4-16-57 to 5-15-57

Additions to Payroll:

9-1-56 to 5-15-57

New Hires	3	20
Re-Engaged	0	1
Reactivates	7	36
Transfers	14	120
Re-Hires	0	12
	<u>24</u>	<u>189</u>

Removals from Payroll:

Deaths	1	3
Retirements	2	11
Terminations	4	72
Deactivates	8	45
Transfers	6	58
Lack of Work	0	2
	<u>21</u>	<u>191</u>

5. Requisitions

No. of Openings as of 4-15-57	14
Additional Openings, 4-16-57 to 5-15-57	19
Openings Cancelled	3
No. of Openings Filled	14
No. of Openings as of 5-15-57	16 *

*Six commitments and two on "hold" status.

6. Disciplinary Action

	<u>May</u>	<u>9-1-56 to 5-15-57</u>
Employee Contacts Received	3	13
Warning Notices Received	3	4
Discharge Notices Received	1	1
Suspension Without Pay Cases	0	0
	<u>7</u>	<u>18</u>

Employee Benefits and Services

1. Military Service

		<u>Current Month</u>	<u>9-1-56 to date</u>
Interviews:	Total	4	32
Preparation of Requests for Deferments		1	26
Returned from Military Service		1	4
Entering Military Service		2	3

1. Military Service (Continued)

	<u>Current Month</u>	<u>9-1-56 to date</u>
Letters Requesting Deferment or Reclassification:		
Deferment in S.S.S. Draft	1	28
Reclassification of Stand-by Reserve	1	19
Availability Status	0	9
Deferments Allowed for One Year	1	16
Deferments Denied for One Year	1	3
Deferments Appealed (State Board)	1	2

2. Employee Purchases

Special purchases handled by this office	1	14
Complaints by employees investigated and resolved	1	4
Letters written to obtain special G.E. goods	0	18

3. Retirement Program

	2	12
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4. Employee Loans

Educational loans initiated	0	6
Educational loans completed	2	28

5. Deceased Employees

	1	3
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Mail and Duplicating

1. Mail and Addressograph

Regular twice daily mail service to 1761-H Building was begun on May 10th.

Statistics

	<u>May</u>	<u>April</u>
Pieces of registered delivery mail	1,102	1,486
Pieces of postal mail	915	622
Pieces of regular mail	512,319	430,191
Number of addressograph orders handled	28	24
Number of addressograph impressions	12,934	11,630

2. Duplicating

The Supervisor, Mail and Duplicating attended a demonstration of latest multilith offset duplicating equipment, held in the 1100 Area. Apart from information of a technical nature, the meeting was interesting from the standpoint that a procedure for "trade-in" of obsolete equipment (government approved) was announced. The use of this newly adopted procedure would enable

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2. Duplicating (Continued)

user components to modernize their duplicating facilities by trading in used or out-dated equipment. In the past the cost of such equipment had to be fully amortized before new equipment was purchased.

During May, new auxiliary card guides which accelerate machine set-up for running 3" x 5", 4" x 6", and 5" x 7" card sizes were ordered for off-set presses located in 100-H and 100-K Areas.

A trial order was placed for a supply of "deleting fluid", reputed to be successful in eradicating typed, ruled or drawn images from offset paper masters. The chemical will be tested as to practicability and safety.

Statistics

<u>Off-Set</u>	<u>May</u>				<u>April</u>
	<u>100-H</u>	<u>100-D</u>	<u>100-K</u>	<u>Total</u>	<u>Total</u>
Orders Received	671	238	244	1,153	1,129
Orders Completed	671	275	244	1,190	1,203
Orders on Hand	0	28	0	28	15
Xerographic Masters Made	437	406	---	843	485
Total Masters Handled	2,695	864	1,450	5,009	4,263
No. of Copies Duplicated	214,284	34,525	38,475	287,284	266,831

Verifax

Orders Received	65	66
Orders Completed	65	65
Orders on Hand	0	0
Total Masters Handled	834	506
No. of Copies Duplicated	3,208	2,268

FIRE PROTECTION

Organization and Personnel

	<u>Exempt</u>	<u>Non-Exempt</u>
Employees - Beginning of month	11	41
Voluntary termination.	0	1
Fireman deceased	0	1
Employees - End of month	11	39

Fire Responses

IPD	1	Loss.	Nil
Outer Area.	1	Loss.	Nil

Description of Fires

IPD - 100-K Burning Pit - 1:02 p.m., May 17, 1957. Fire from Burning Pit spread to grass and brush; damage was nil.

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Description of Fires (Cont'd.)

Outer Area - 1:13 p.m., May 25, 1957. The West Richland Supply Company started a brush fire while cutting guys to telephone poles with a cutting torch, approximately 100 acres burned.

Drills Held During May

Outside drills	50
Inside drills.	44
Feet of ladders used on drills	None
Feet of hose used on drills.	9,470

Meetings

<u>Type of Meeting</u>	<u>No. of Meetings</u>	<u>No. Attending</u>
Round Table	3	31
Informative	4	41
Safety	8	82
Security	4	40

General

Fire Protection in conjunction with Health and Safety completed the revision of the Rescue Team Training Manual.

All hydrants in IPD and White Bluffs were tested and recommendation made for replacement of 41 and repairs to others.

A chemox mask demonstration was held at 184-H Building for 22 members of Power Operation.

Forty members of Construction Engineering were instructed in treatment of accident victims and demonstration was given on artificial respiration.

A discussion of White Bluffs Fire Station Operation with 28 members of 100-B Power Operation was held in conjunction with their safety meeting.

Repairs to the front and side walls of the Fire Station are in progress to eliminate a dangerous condition.

Fire Extinguisher Activities

Inspected.	774	Handlines inspected.	15
Installed.	5	Handlines serviced	7
Seals broken	27	Hose boxes inspected	19
Serviced	337	Gas masks serviced	2
Weighed.	303	Gas masks inspected.	13

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UNION RELATIONS

On May 24, 1957 official notification was received from the National Labor Relations Board Regional Director that the unfair labor practice charge filed against the Company last October had, with their approval, been withdrawn without prejudice. This charge was filed following the Company's refusal to recognize the Hanford Atomic Metal Trades Council as the bargaining agent for certain Engineering Assistants working in 1706 KE and KER.

The National Labor Relations Board will hold a hearing in Richland on June 4 to hear testimony concerning the joint petition submitted by the Company and the HAMTC. This joint petition was filed following agreement by the HAMTC to withdraw their unfair labor charge. The NLRB will decide whether or not Engineering Assistants working in 1706 KE-KER are engaged in production work and hence should be represented by the HAMTC.

A non-unit grievance, the first since reorganization, was received from three Engineering Assistants in 1706 KE-KER. The basic problem was a misinterpretation of previous statements made by supervision. At our suggestion, supervision and the employees met to discuss the points in question. We are informed that the employees now feel the matter has been resolved to their satisfaction.

Engineering Assistants in 1706 KE-KER presented supervision with two petitions signed by 12 of the 13 people assigned to that building. One petitions indicated that they had not authorized or requested representation by any union. The second petition indicated that they were well satisfied with their present bargaining system in their work location and did not wish to be represented by the Hanford Atomic Metal Trades Council.

IPD Grievance Statistics 4-23-57 through 5-22-57

A total of 15 grievances were received and three 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	15	1
Received this year	87	1
<u>Step I</u>		
Answer unsatisfactory	11	0
Answer satisfactory	4	1
Pending time limit	14	0
Settled this month	6	1
<u>Step II</u>		
Discussed this month	7	0
Pending time limit	7	0
Settled this month	4	0
<u>Arbitration Pending</u>	1	0
<u>Total Settled This Month</u>	10	1

Subject of May 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>Res.& Eng.</u>	<u>Prod.</u>
Jurisdiction	3	2	2	2	2					
Overtime				1						
Transportation			1							
Shift Assignment					1					
Reclassification	—	—	—	1	—	—	—	—	—	—
TOTAL	3	2	3	4	3	0	0	0	0	0

Non-Unit

Work Assignment	—	—	—	—	—	—	—	—	1	—
TOTAL	0	0	0	0	0	0	0	0	1	0

Bargaining Unit Check-Off Statistics

	<u>Last Month</u>	<u>This Month</u>
Cancellations	10	11
Additions	13	16
Total Participating	958	963
Total in Unit	1467	1468
% Participating	65.3	65.6

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SALARY AND WAGE ADMINISTRATION

Salary Administration

The most significant activity in Salary Administration during May was a reconciliation trip made by the Manager, Employee Compensation, and the Specialist, Salary Administration. Departments visited included Atomic Power Equipment at San Jose; Aircraft Nuclear Propulsion, Flight Propulsion Laboratory, and Jet Engine at Cincinnati. Also visited was the duPont Savannah River Plant, the office of Mr. Stuart Pratt of the duPont Company at Wilmington, and Messrs. Blesh and Hutchinson of the Company's Compensation Service. Results of the trip will be summarized separately by letters confirming reconciliations reached. In general, good substantiation of established Irradiation Processing Department position levels was obtained.

CHANGES OF STATUS OF PERSONNEL

Transfers into Dept.	<u>1</u>
Transfers out	<u>0</u>
Location Changes	<u>17</u>
Suffix Changes	<u>15</u>
FLSA Changes	<u>6</u>
Reassignments	<u>20</u>
Total	<u>59</u>

CHANGE IN SALARY OF PERSONNEL

Promotional Increases	<u>3</u>
Salary Review Increases	<u>46</u>
Interim Merit Increases	<u>0</u>
Salary Adjustments	<u>10</u>
Total	<u>59</u>

Wage Administration

The appraisal of all secretaries eligible for consideration for merit increases were completed by May 15, 1957. Twenty-nine employees were eligible for consideration, but only seventeen were in positions having increases available.

At the request of the Operation's management, three meetings have been held with secretaries to explain the new secretarial evaluation plan. Meetings were held in 100-H Area and 700 Area. Thirty-five employees were present. A meeting with supervisors in Facilities Engineering Operation will be held in 100-F Area to explain the Plan on May 28, 1957.

The retitling and reclassification of the Draftsman-Design III classifications have been completed and were effective April 15, 1957. Five employees were affected.

CHANGES OF STATUS OF PERSONNEL

Transfers between Depts.	<u>16</u>
Transfers within Dept.	<u>41</u>
Location Changes	<u>0</u>
Reclassifications	<u>10</u>
Retitles	<u>57</u>
Total	<u>124</u>

CHANGE IN SALARY OF PERSONNEL

Automatic Increases	<u>74</u>
Reclassifications	<u>43</u>
Merit Increases	<u>14</u>
Total	<u>131</u>

Salary and Wage Records

We have investigated the possibility of producing the quarterly "Salary Distribution Data Report" and "Salary Distribution by Level Report" through IBM. It appears that this cannot be done at this time, on an individual department basis, due to high cost involved. It is anticipated this can be done later, when all departments agree to reproduce their reports in this manner. This would probably make it economically feasible at that time. We did receive suggestions from IBM which should prove helpful in compiling this report. This involves the use of IBM runs issued by IBM for payroll which would provide the information needed for the reports, and has the information more logically arranged than is the case of our present IBM runs. The adoption of this suggestion would eliminate the necessity for purchase of two IBM runs we are now receiving. This would permit an estimated annual savings of around \$300.00. Discussions will be held with Payroll to determine if we can be furnished copies of their runs.

A report was compiled as requested by W. E. Johnson, General Manager at HAPO, showing a "ratio" of supervised to supervisors. The report was arranged to show numbers of supervisors, other exempt and non-exempt, and the ratio of supervisors to non-exempt. Copies of the report were exchanged with other Salary and Wage components for informational purposes. The report will be issued on a quarterly basis in the future.

E. J. Fitzgerald

 MANAGER
 EMPLOYEE RELATIONS

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FINANCIAL OPERATION
MONTHLY RECORD REPORT
MAY, 1957

Administrative Planning

Considerably improved interest in the IPD Instruction System was realized during the month following a review by the General Manager in his staff meeting of the status of the system, and the publicizing of the decision to implement all HAPO OPGs, as well as pertinent elements of HAPO OPG 1.2, Performance of Special Functions. This has stimulated a review of these functions which should prove decidedly beneficial to the work of the department.

A total of approximately 19 OPGs and 33 Advices remain unpublished, with the completion and issuing of 3 new OPGs, 6 new Advices, and 19 revised Advices during the report period. Fourteen Organization Announcements were released upon approval by the Level III Managers concerned.

Utilization of funds made available under the Professional and Trade Societies Meeting Attendance Control Budget was surveyed, with the apparent balance of non-earmarked funds being re-allocated to those having additional needs. Forecast requirements for FY-1958 are largely complete, with an increase of approximately 20% being desired.

Although services requested of other General Electric components under the Assistance to Hanford Program were low during this fiscal year, a decided increase is anticipated for next year with principal services being requested of the General Engineering Laboratory. A letter requesting suitable funds from the AEC has been prepared for clearance through Contract Administration.

Requirements for funds for Off-Site Courses and Seminars remain obscure, largely due to lack of information on courses to be held. An amount comparable to that made available for FY-1957 is considered to be reasonable.

A decision was made to hold the General Manager's Report to Employees Meeting on September 10 and 11, with data to be based on either the fiscal year or the department anniversary year.

The first issue of the revised Department Record Report was released for publishing on May 27.

General Accounting

The number of General Accounting personnel on May 31, 1957 was 32; 7 exempt and 25 non-exempt. As part of our personnel development program, an exchange of one non-exempt employee was made between Plant Accounting and General Accounts.

Total available manhours were reduced by 280 due to vacations taken by four employees. Non-exempt manhours lost during May as a result of absenteeism were 129.6; a 3.48 percent loss. "Personal Business" accounted for 65 percent of the absences.

The first quarterly financial review was held on May 16, 1957, at which time accounting data was presented to the General Manager and Level III Managers.

During May, 1957 the AEC assigned financial responsibility in the amount of \$467 to the department for all radium in the department's custody.

Reduction of the level on FY-1957 equipment funds from \$5,616,000 to \$5,000,000 in the revised financial plan for HAPC resulted in a re-allocation of equipment funds to the Level II components. IPD received only a slight increase - from \$890,000 to \$895,000.

The Plant Acquisition and Construction budget for FY-1959 and revision of the budget for FY-1958 has been submitted by HOC-AEC to Washington-AEC. Changes proposed by HOC-AEC were reviewed by General Electric; and, in most cases, our recommendations were incorporated into the formal budget to Washington.

Eleven Requests for Appropriations totaling \$206,819 were approved in May, 1957. AR: 57-IP-38, "Poison Spline Reactor Control Equipment", accounted for \$194,500 of the amount approved.

Research and Development was credited \$11,000 and Plant Assistance was credited \$23,000 in order to reduce over-liquidation of cost from Reactor Design Analysis Operation and Industrial Engineering Operation respectively. The remaining over-liquidation of \$29,495 for Facilities Engineering Operation is applicable to Construction Work In Progress.

A four-part custodian record for IPD movable property was prepared and printed by IBM. The cards will replace manually printed McBee cards. As Plant Accounting detail history records are posted, a perforated transmittal tape is produced simultaneously as a by-product by use of a typewriter tape punch machine. The tape is the medium by which IBM is notified of changes, and which results in the issuance of new up-to-date custodian records.

Verification of movable property records at the end of May disclosed a total of 84 items of movable property not located and 204 items located not on record.

Product Cost and Budgets

The FY-1958 Revised Operating Expense budget was adjusted in accordance with certain over-all HAPC required reductions. Adjusted budget details are now available for distribution to IPD management.

Sixty-eight Savings and Improvement report items were received from IPD components. These items have been edited, cost calculations completed and dupli-mat masters typed. After receipt of fourth quarter FY-1957 items, the report for FY-1957 will be complete.

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A document was completed comparing power operating cost for D, DR and H Areas under pre and post CG-558 operating conditions.

An essential material inventory procedure was prepared for review by the IPD auditor.

A method for reporting Process Technology costs by the organization as incurred in HLO was established through the cooperation of their Financial Operation. This information was specifically requested by O. H. Greager and will be reported as a separate schedule in his monthly analysis letter.

An improved report for "Off-Site Special Irradiations" (number 512-62-M) was designed and issued with April costs. The method of reporting was based on information procured from meetings with A. G. Blasewitz and W. H. Clark, Irradiation Testing Operation.

A report was prepared on the results of the physical inventory of coal. Recommendations were made for adjustment of Essential Material and Coal inventory reserves.

Personnel Accounting

Cards certifying receipt of safety awards by employees are being accounted for in order to include the value of such prizes in each employee's taxable income for 1957.

Personnel Accounting participated in the Financial Operation presentation to IPD management on May 16. The nature of comments received following the presentation indicates that future presentations of this type would be beneficial in obtaining mutual confidence and understanding.

Individual Insurance Plan certificates were delivered to participants in the plan. These certificates are of morale value only and are not used as evidence of coverage in case of claims for reimbursement.

Auditing

A report was issued for the audit of General Accounts covering the period September 1, 1956 through February 28, 1957.

An audit memorandum was issued for a review of the employee sales plan for the period October 1, 1956 to March 31, 1957.

Results of a test of timekeeping in all 100 Areas on May 10, 1957 were reported during the month.

Records supporting the safety award for which the department qualified on May 30, 1957 were examined and results were reported in an audit memorandum.

Procedures

The task force studying office automation met twice during the month. This group has, thus far, standardized flow-charting methods and has made brief studies of such source documents as purchase requisitions, second class invoices, and printing and duplicating orders.

Forms control and review continued to pose a considerable problem from the standpoint of clerical assistance in processing orders for forms and design of forms. It is anticipated that this problem will be somewhat alleviated by the addition of a Forms Clerk to the Procedures group.

The study of work authorizations continued with a review being made of work performed by the department for other departments and operations. It appears that work orders are being used to authorize some work that could have been authorized on work requests. This possibility is being discussed with Management and, also, with Procedures Specialists of other departments and operations.

Manager-Finance
IRRADIATION PROCESSING DEPARTMENT

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**DATE
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9 / 17 / 92**