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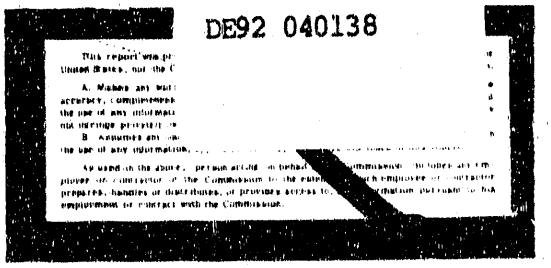
MONTHLY RECORD REPORT

IRRADIATION PROCESSING DEPARTMENT

HW--49205-Del.

MARCH, 1957



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Compiled by

IPD PERSONNEL

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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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HW-49205

IRRADIATION PROCESSING DEPARTMENT
SUMMARY
MONTHLY RECORD REPORT
MARCH, 1957

RESEARCH AND ENGINEERING OPERATION

The pilot charging of I & E slugs at C Reactor is continuing at a nominal rate of 50 tubes/month; of 250 tubes charged, 200 remain under irradiation. The exposure level is being increased to 700-850 MWD/T under a modified variable goal discharge schedule. Various methods and designs are being checked and tested to reduce the high top-of-annulus temperatures with some success. Other I & E slug tests are being conducted out-of-pile for the K type and are being initiated for the B-D-F size. To date there have been no I & E slug failures. Other fuel tests include a 50 ton per month charge schedule to load the core of KE Reactor with cored slugs having a 0.5 inch axial void and the continued charging of Tru-lined slugs at C Reactor in about equal proportions with standard canned slugs.

A production test to operate B and F Reactors with higher front graphite temperatures was authorized in an attempt to recover distortion which is currently being felt at the front of the uppermost tubes in B, D, and F Reactors where the graphite temperatures are low.

The Radiation Control Standards and Procedures Manual (HW-45674) was issued. Additional Standards and Procedures will be issued for inclusion in the Manual as they are approved.

Tests were conducted to establish more firmly the feasibility of increasing the K Reactor's cooling water flows with existing facilities.

The proper alum and Separan feed rates were established to treat river water containing 950 ppm turbidity and produce filtered water satisfactory for reactor cooling. The previous record for turbidity was 360 ppm in 1948.

Unexpectedly high temperatures were observed at the top of the DR biological shield. Heavy poisoning of the top fringe of the pile reduced the maximum temperatures from 195°C to 135°C. During the next DR outage enrichment will be loaded to balance top to bottom flux distribution after which the effect of the poisoning effort can be better assessed.

PRODUCTION AND REACTOR OPERATIONS

Input production (Pu) for March was 101 percent of forecast. The above forecast average operating power level more than offset a below forecast time operated efficiency. Record production was achieved at KW, exceeding their previous maximum 4.3 percent.

Output production for March was 109 percent of forecast due to discharges during unscheduled outages late in the month.

The maximum established power levels (including burnout) were increased 185 units at B, 75 at KE, and ten each at DR and H. The increase at B Reactor was due to the relaxation of tube power limits and continued gains from increased cooling water following the installation of CG-558 facilities; at KE to improved flattening

[redacted]

resulting from charging a curtain of cored slugs in the far-side fringe; at DR to further gains following CG-558; and at H to improved flattening made possible by the replacement of depleted fringe enrichment.

Fifty-two reactor outages, of which 24 were scrams, resulted in an overall time operated efficiency of 64.2 percent which includes 22 outage days at D Reactor for CG-558 work. Forecast was 68.0 percent. Time lost for rupture removals, recovery of 3X system balls at B Reactor, and tube replacement exceeded that gained by postponement of a seven-day CG-651 outage at C Reactor.

Twenty-four ruptures of slug jackets during March required 167.1 reactor outage hours for removal. Twenty of these were regular metal, including one charged on a Production Test; three were Production Test cored E metal (5/8" core) and one was 1/2" cored regular metal. Fifteen of the regular metal failures were at C, two at H, and one each at DR, F, and KE. The three 5/8" cored Production Test ruptures were at C and the 1/2" cored regular metal rupture was at KE. Three of the ruptures were removed by the "quickie" method.

Tube replacement outages were conducted at B, D, F, and H Reactors. Sixty-seven regular tubes were replaced at B, 80 at F, and 52 at H. Nine problem tubes were removed and replaced at D and five at H.

Columbia River turbidity reached an all-time high of 1620 ppm early in the month. Satisfactory process water quality was maintained throughout this difficult period by appropriate modifications of treatment.

Significant items of equipment experience during the month, other than the CG-558 outage at D Reactor, were: (1) A complete ball drop at B Reactor was caused by a short in the Ball 3X hopper solenoid circuit. (2) Extensive cavitation damage was discovered in the suction vanes of the primary impeller of all process pumps recently installed in 190-B Annex under CG-556. (3) Ground settling around DR Reactor continues to be observed. During the month, settling became apparent in the monitor room and lunch room areas. (4) A river pump at KW was pulled and given a Class A overhaul. This was the first overhaul of this type pump since K, start-up. (5) Eight reactor water leaks were corrected during the month. Four were leaks in "O" ring seals on special rear nozzles at F, two were tube leaks (C and H), and two were Van Stone leaks (B and F).

There were no disabling injuries or formally investigated radiation incidents during March. Two security violations (open document files) occurred.

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

FACILITIES ENGINEERING OPERATION

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

Project Number	Title	Completion Schedule*	Completion Actual
CA-512	100-K Area Facilities, Revisions 3, 4, and 5	100	100**

Construction Completion Status (continued)

Project Number	Title	Completion Schedule*	Completion Actual
CA-512	1706-KER Recirculating Facilities	100	100
CG-558-I	Reactor Plant Modifications	98	98
CG-558-II	Reactor Plant Modifications	80	71
CG-600	100-C Alterations	81	31

* Per Certified Schedule or Directive Completion Date.
** Complete except for revisions and start-up items.

Completion percentages for the design of the reactor proper and of reactor buildings on Project CG-654, "Advance Reactor Design" are summarized as follows:

	Last Month	This Month
Drawings	100%	100%
Criteria	100%	100%
Testing	65%	73%
Weighted Overall	92%	94%

Kaiser Engineers effort for this project is complete.

Recommendations for alleviating the swing characteristics of the boilers operating in parallel at 184-B Building have resulted in changes to the coal handling equipment which diminishes segregation of coal particle sizes. Tests are planned to evaluate the affect of the changes.

The warped VSRs from 105-KE have shown increasing warp since being removed from the reactor. This appears to substantiate the theory that the rods are undergoing progressive stress relief which can be overcome by annealing.

New cracks have appeared during the month in the 105-DR Building which indicate that settlement continues. Foundation repair is being investigated.

CG-558

Examination of the De Laval pumps in 190-B after from 60 to 90 days operation reveals the impellers in the first pumping stage have suffered serious cavitation.

Modified wear rings are being installed to reduce the cross sectional area of the impeller eye of these pumps to alleviate the problem until the manufacturer provides two impellers of new design for testing. These are promised in three months.

After a five week shutdown, the project work in 100-D Area was completed and accepted on March 22, 1957, with two exceptions. Reactor startup was March 29.

[redacted]

The outage in 100-F Area commenced March 26, 1957, for tube replacement; project work will start April 1.

Progress of the work in F may be adversely affected by a current jurisdictional dispute between millwrights and electricians. Failure of the millwrights to report to work on March 27 is the first violation of the agreement not to initiate a strike during an outage.

EMPLOYEE RELATIONS OPERATION

In Personnel Development, the Department exempt manpower inventory reached 55% of completion. Agreement was obtained with other departments and operations on improvements in the administration of the Technical Graduate Rotational Program. Communication activities followed the normal pattern with the exception that increased attention was directed toward strengthening Union Relations' communication activities. The entire backlog of re-evaluations in the Supervisory Selection Program was completed. The Specialist responsible for this program attended a depth interview training course in Schenectady during the month. Activity to up-date IPD personnel records in Manufacturing and Engineering Services registers began.

Eight Ph.D. candidates were interviewed, resulting in four employment offers. Placement of professors and graduate students on the Summer Program is essentially complete; Juniors remain to be placed. Transfer activity and experienced BS-MS recruiting remains at a fairly constant level. Military service questionnaire returns reached 99.5%. Other Employee Benefits and Services action involved preparations for a Savings and Stock Bonus Promotion program, resolution of Suggestion Plan problems, further investigation relating to educational loan possibilities, and resolution of unusual problems arising from administration of the Comprehensive Insurance Plan. The round of duplicating method instructional classes was completed this month, all 100 Areas having now been covered. A new Verifax master-transfer attachment and a Xerox paper dispenser were received and placed in operation.

The cost-of-living index continued to rise and on February 15 a new high of 118.7 was reached. There were no developments in March regarding the Hanford Atomic Metal Trades Council's charge of unfair labor practices pertaining to certain work being performed in Buildings 1706-KE and KER. Sixteen of the 23 grievances received this month were on the subject of overtime distribution. One request for arbitration of a grievance was received and one previous request for arbitration of another grievance was withdrawn.

Reconciliation of exempt positions received a major portion of attention during March. Following independent preliminary studies, a two-day meeting was held by HAPO Salary Administrators and a representative of the Flight Propulsion Laboratory, A.G.T. Plans have been made for further reconciliation work with other divisions of the Company during April and May. Greater emphasis has been placed upon study of the Salary and Wage records and statistics function. The study has been reoriented to consider reassignment of responsibility for maintenance of records and compilation of statistics. Preliminary plans have been endorsed by the Company's Traveling Auditor. Ground rules covering the Administration of the new secretarial classifications have been agreed upon by HAPO Salary and Wage Administrators. Job evaluations are underway for secretarial positions requiring this action, and it is planned to make such reclassifications

effective April 1, in all departments.

There were three fires during the month with a total loss of $60; Relations and Utilities' loss was $10 and private, $50. A fire engine was used at 105-H for high pressure pumping. Fire Protection conducted one class on chemox masks and assisted in one fire demonstration at 105-C, with 37 IPD employees attending these demonstrations.

Irradiation Processing employees became eligible for the Central Safety Council Award Plan on March 17, 1957, by operating 150 consecutive days without a disabling injury. Supervisory Safety Conferences were inaugurated during the month. Serious Accident IPD No. 6 occurred on March 31, 1957, and involved a rupture in a heater section in one of the loop circuits in the K operations. Complete details will be made available as soon as investigation is completed.

FINANCIAL OPERATION

OPG 6.2, Policy on Management of Landlord and Other Government Property, was revised to clarify assignment and Landlord relations. No changes were made in property assignment.

Consultant Agreement CA-160 with A. Hollander of Los Angeles, California and Requirement Contract RC-41 with Irving M. Sabin Company, Incorporated and RC-42 Diamond Alkali Company, for essential material, were received and reviewed.

Operating Budgets for Irradiation Processing Department were completed, reviewed with Plant Managers and the Department General Manager and submitted to Contract Administration for consolidation.

Approval was received from the Atomic Energy Commission to pay shift differential to exempt employees at 10% of the earnings while on shift. This payment will be retroactive to February 1, 1957.

The routine review of material passes for proper documentation to establish accountability for material removed from the plants was transferred to General Accounting Operation.

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IRRADIATION PROCESSING DEPARTMENT

MONTHLY REPORT OF INVENTIONS OR DISCOVERIES

MARCH, 1957

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

Name	Title
H. F. Jensen	Air Cooling of Vertical Safety Rods

General Manager
IRRADIATION PROCESSING DEPARTMENT

AB Greninger:mfa

RESEARCH AND ENGINEERING OPERATION

MARCH, 1957

VISITORS AND BUSINESS TRIPS

G. Westfall, Knolls Atomic Power Laboratory, visited HAPO to discuss loop construction and operation with representatives of the Coolant Testing Operation on March 25 and 26, 1957.

J. H. Brown, Process and Reactor Development Operation, presented a paper at an A.E.C. sponsored meeting at North American Aviation Company, Los Angeles, California, March 2-10, 1957.

D. H. Curtiss, Process and Reactor Development Operation, attended a symposia on radiation damage to materials at John Hopkins University, Baltimore, Maryland; General Electric Company, New York City; and visited Pennsylvania State Univ. to discuss the Carbon Research Program, March 25 to April 5, 1957.

W. K. Alexander, Process and Reactor Development Operation, visited the Phillips Petroleum Company at Idaho Falls, Idaho to review organics information, March 27-30, 1957.

P. C. Jerman, Process and Reactor Development Operation, attended the Nuclear Congress in Philadelphia and a General Electric Conference on Radiation Protection at Cincinnati, Ohio, March 5-13, 1957.

J. K. Anderson and R. L. Turner, Process Technology Operation, attended the Nuclear Congress at Philadelphia and visited the E. I. du Pont Company at Aiken, S.C. to discuss process control methods, March 9-20, 1957.

G. C. Fullmer, Operational Physics Operation, visited the Stanford Research Institute at Menlo Park, California regarding reactor research and development work; attended A.E.C. Control Rod Meeting at Canoga Park, California to present a paper, March 5-8, 1957.

C. L. Miller, Operational Physics Operation, presented a paper at and attended the A.E.C. Control Rod Meeting at Canoga Park, California March 6-8, 1957.

E. L. Burley, Coolant Testing Operation, visited North American Aviation Company at Idaho Falls, Idaho to discuss the organic coolant development program March 28 and 29, 1957.

ORGANIZATION AND PERSONNEL

	Permanent		Rotational	
	Feb.	Mar.	Feb.	Mar.
Management and Administration	4	4		
Process and Reactor Development Operation	27	27	5	5
Process Technology Operation	36	36	4	4
Operational Physics Operation	18	18	7	6
Irradiation Testing Operation	20	20	5	5
Coolant Testing Operation	23	23	2	2
Component Testing Operation	21	21	1	1
	149	149	24	23

Operational Physics Operation: L. B. Ufkes, Engineer II, was transferred to the B & C Reactor Operation effective 3/1/57. C. E. Bowers, Engineer II, was transferred from Relations and Utilities Operation effective 3/1/57.

Coolant Testing Operation: K. L. Young, Engineer II, was transferred from Relations and Utilities Operation effective 3/1/57. K. G. Golliher, Engineering Assistant, terminated effective 3/29/57.

PROCESS AND REACTOR DEVELOPMENT

Reactor Fuels

I & E Slugs

The pilot charging of I & E slugs continues at a nominal 50 tubes per month rate at C-Pile. About 250 tubes have now been loaded and, of these, approximately 200 remain under irradiation. The exposure level of these pilot charges is being increased to the range 700-850 MWD/T under a modified variable goal discharge schedule. All charges now being made are into corroded tubes and consist of the full complement of 32 slugs per column. No I & E slug failures have yet been experienced at HAPO.

Two potential methods of reducing the high top-of-annulus temperatures in I & E slug loaded tubes at C-Pile were attempted in-pile. Two new process tubes with rib heights reduced 20 mils were charged with I & E loads; the ratio of coolant ΔT at the top-of-annulus to the bulk average was reduced from an expected 1.7 to an acceptable 1.2 as a result of the 20 mil rib height reduction. However, the methods used to achieve this rib height reduction were very time consuming and a satisfactory technique for use in-pile is not yet developed. Also, a short section of a perforated dummy slug was placed downstream of an I & E column to observe the water mixing effectiveness of this piece. It had no observable effect on the coolant temperature unbalance. Other variations of this method and other designs of water mixing elements are in varying phases of fabrication and testing.

The out-of-pile hydraulic testing in support of the K-Pile I & E tests has been completed by the Hanford Laboratories; this work shows the K-Pile I & E to have a ten percent greater hydraulic resistance than the standard solid slug. This would mean a 3 to 4 percent flow reduction at the K-Piles for a central zone load when all factors are considered. The small-scale test program for the K-Pile I & E slug will proceed as scheduled and the initial in-pile hydraulic and coolant temperature data obtained at K-Pile will be used to slightly modify the I & E slug design for that reactor. Components for the B, D, F size I & E slug are now available and out-of-pile hydraulic tests are scheduled to be performed next month.

Cored Slugs

Cored slugs with a 0.5 inch axial void are now being received at a 60 ton per month rate. About 50 tons per month are scheduled for KE-Pile to load the core of that reactor with cored elements. A 0.5 inch cored slug failure was experienced at KE-Pile which has been identified as a cap failure. Copious quantities of radioactive gases were released by the failed element.

A cored slug test using 1.44 percent enriched uranium to simulate 100°C bulk outlet coolant tube powers was charged at C-Pile to determine the relative dimensional stability of cored slugs with 3/8, 1/2, and 5/8 inch axial voids; this material is operating at maximum specific powers somewhat in excess of 90 KW/ft. Three of the four tubes containing 5/8 inch cored slugs failed at exposures below 200 MWD/T and the test was discontinued. The mechanism or reason for failure has not yet been established.

M-388 Jackets

Process tubes with B, D, F annuli have been installed in C-Pile to obtain high temperature tests of aluminum alloy M-388 slug jackets. The slugs in a tube possess 1245 jackets and M-388 jackets alternately. One column experienced a 1245 jacketed slug failure and, although the failure has not yet been examined in detail, considerable evidence of slug cocking and/or column bowing is present.

Tru-lined Slugs

Tru-lined slugs possessing the earlier "ball-socket" design continue to be charged at C-Pile in about equal proportions with standard canned slugs. No failures have yet occurred in Tru-lined elements.

Advanced Fuel Element Tests

The large diameter cored fuel element (1.8 inch O.D. - 0.75 inch I.D.) was charged in the KE-Reactor front-to-rear through hole facility. The seven rod cluster sized for a nominal 2.1 inch I.D. process tube was also charged into a KE-Reactor through hole facility this month.

Fuel Element Production Test Status

The current status of production tests supporting fuel element irradiations is as follows:

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	885	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. Not yet loaded. 10 matrix enriched and 12 natural matrix slugs.
		1	B or D	6000		
105-608-A-56MT Dingot U Supplement A		23	D			Three charges of alternated regular metal and dingot pieces from each month's dingot uranium shipments are to be irradiated to high variable goal exposure
		24	D	Normal goal	330-420	23 tubes have been discharged at goal. Rupture occurred in regular metal control piece at 947 MWD/T.

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TABLE I (Continued)

Test Number	Type Metal	No. of Tubes	Reactor	Goal Exposure	Current Exposure	Remarks
105-634-A	Cocked Slugs	24 cocked	C	200,400-600	410-580	Investigates the contribution of cocked slugs to "hot-spot" failure rates. Fourteen discharged at goal exposure.
		8 control	C	200,400-600	540-580	Five discharged at goal exposure.
105-636-A-58MT	C-Metal	20	C	Normal Burnout	Loaded 9-23-56	10 charges each of double-length and Tru-lined "C" slugs will be irradiated to normal burnout. Inspection on discharge will determine degree of protection from "chattering"
105-608-A-56MT Supplement B	Dingot U	4	C	2 ruptures		Not yet loaded - compares performance of ingot and dingot uranium slugs.
105-620-A-65MT	Tru-line	637	C	Normal goal		Provides for quantity charging of Tru-line slugs.
DT-105-623-A	Regular		DR	Normal goal		Provides for hand seating of charges loaded on alternate outages. Investigates effect upon failure rate.

TABLE I (Continued)

Test Number	Type Metal	No. of Tubes	Reactor	Goal Exposure	Current Exposure	Remarks
IP-1-A	1.44% U-235 I & E Lead Dip	4	C	2 ruptures	about 280	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.
	1.44% U-235 Solid, Lead Dip Canned	4	C	2 ruptures	about 260	
IP-19-A	Lead Dip Canned	250	C	800 variable	50-650	Provides for the pilot charging of I & E slugs at C-Reactor. Initial charging rate - 50 tubes/ month.
IP-30-A	1.44% U-235 3/8" cored	4	C	2 ruptures	about 130	Three failures occurred in 5/8" cored enriched charges at 132, 135, and 195 MWD/T. All other enriched charges discharged because of excessive emission of radioactive gas associated with failures in this material.
	1.44% U-235 1/2" cored	4	C	2 ruptures	about 140	
	1.44% U-235 5/8" cored	4	C	2 ruptures	about 150	
	1.44% U-235 Solid	4	C	2 ruptures	about 115	
	Solid 3/8" cored 1/2" cored 5/8" cored	12	C	400,000,000	about 70	

TABLE I (Continued)

Test Number	Type Metal	No. of Tubes	Reactor	Goal Exposure	Current Exposure	Remarks
IP-32-A	Insulated Cored Slugs	1	KW	600	480	Three insulated, cored slugs. Irradiation being conducted in front-to-rear test hole.
IP-42-A	Solid Slugs With M-388 (1% Ni) alloy jackets, lead dip canned	4	H5	900	840-860	Investigates uniform corrosion resistance of M-388 alloy. One tube discharged due to rupture in control piece at 117 MWD/T.
		3	C	600	about 230	
IP-56-A	Dingot U	8	DR	300,500,700	about 30	
		10	DR	Normal	about 30	

Reactor Physics

Lattice Physics Measurements

The prototype Physical Constants Test Reactor, the prime source of lattice physics data during the past year, will devote the remainder of FY-57 to Category III activity. To provide information essential to the Category II (IPR) program HLO is reactivating the exponential program; this program will consider fuel elements of nominal 1.68, 1.93, and 2.5 inches O.D. in a range of coolants and lattice spacings.

Analysis of experiments previously performed is proceeding. In particular, the following data have been derived for the seven rod cluster element sized for a nominal 2.1 inch I.D. process tube in a 7.5 inch lattice:

	Wet Lattice	Dry Lattice
P (resonance escape probability)	0.85	0.902
f (thermal utilization	0.849	0.917
ϵ (fast effect)	1.022	1.025
ICR (Initial Conversion Ratio)	0.886	0.905

Cold lattice reactivity gain upon loss of water - about 800 inhours

Lattice Physics - Present Reactors

Calculations of the thermal utilization for ranging lattices with various slug geometries of interest in advanced reactors has been nearly completed using the method of the P_3 approximation to the solution to the transport equation.

The effect of increasing the O.D. of the uranium core in I & E slugs at the expense of the aluminum, i.e., increase the uranium O.D. holding the canned slug O.D. fixed, shows an increase in conversion ratio of about two percent for a 20 mil reduction in can wall thicknesses. This result is valid for all the HAPO reactors. In the specific case of the older reactors a reactivity gain of about 100 inhours will also be realized when a 0.0005 inch nickel cladding is taken into account assuming the can wall thickness reduction is obtained by the hot press method.

Work continues on a two group calculation expected to yield the neutron economy of a fringe poison load. The formalism has been developed and constants determined which yield good correspondence with experimental neutron flux traverses taken in non-poisoned cases.

Nuclear Safety

An analysis of experiments performed in the Test Pile on the "last ditch" safety system involving providing BF_3 under pressure for introduction into the pile gas system under disaster conditions has been completed. These analyses show that at least 3000 inhours of control is provided if the pile is flooded with the BF_3 gas. On this basis installation of the last ditch system at all piles is recommended.

A final report on the experimental work performed at Hanford on the North American Safety fuse program has been written.

The analog mock-up of a Hanford reactor is complete and performs in a satisfactor manner. Efforts are now underway to fix the parameters necessary to compute the expected power excursion following loss of water pressure in a production reactor.

Reactor Engineering

D-DR Reactor Trip Out Tests

Measurements were made of the flow transient associated with BPA power interruption; these data are essential in establishing Process Standards to ensure adequacy of cooling during the initial few minutes after loss of electrical energy to the process pumps. Water pressure data were obtained for the following conditions:

1. Short to ground on a bus supplying power to a third of the electrical load in D and DR areas.

2. A trip out of the pump motors from this bus.

3. A full trip out of the incoming 230,000 volt BPA power to the D-DR areas.

The initial analyses indicate that some energy is lost on a BPA failure as the fly-wheels drive the pump motors causing them to generate power which is fed into any electrical leads remaining on the system. Methods of eliminating this are under study in Facilities Engineering.

Air Addition to Process Pumps

Considerable effort was expended in isolating the quantities of air which could safely be injected into the primary pumps as a method of alleviating the cavitation-erosion conditions experienced at B and DR Piles. It was determined, in conjunction with HLO personnel, that 100 cfm per pump could be safely introduced on a production test basis; i.e., air addition rates of this magnitude could be piloted through test in a manner such that the reactor would not be endangered. It is necessary to provide positive limits on the air addition rates so as to guarantee against loss of pump pressure. The air would come out of solution in the downstream portions of the tube and the resulting non-critical problems, such as the radiological problem, effect on slug rupture detection equipment, could best be determined through reactor test. An alternate solution to the pump problem was found but the data on air addition will be documented for possible future use.

Graphite Distortion

A production test has been authorized to operate B and F Reactors with graphite temperatures skewed to the front in an attempt to recover distortion. The problem of distortion is not yet severe and is felt only in the upper most tubes in the B, D, F Reactors at the front of the active zone where graphite temperatures are low.

Aluminum Process Tubes

Development contracts to procure aluminum process tubes from Hunter Douglas Aluminum Corporation and Harvey Aluminum are being negotiated. Both organizations quote potential tube costs well below current prices charged by ALCOA.

Process Tube Corrosion

Recent data on process tube corrosion shows significant variance between the actual and calculated corrosion rates. Furthermore, there is some indication of a coolant velocity effect not now taken into account in estimating tube life. This effect is being studied intently and estimates of tube life and tube corrosion indices will be corrected as may be indicated.

Reactor Planning

Combined Operations

Studies of the problem of optimum exposure at the reactor sites has continued as part of the effort of the AEC-wide Combined Operations Working Committee. Particular attention has been given the problem of assessing long-range burnout costs and in isolating economic differences in the Hanford and Savannah River operations.

Advanced Engineering

Specific study has been given the problem of optimizing organic cooled lattices with respect to specific power. Variables included are burnout and depletion costs, fabrication costs, enrichment, conversion efficiency, and organic decomposition rates. Capital cost estimates are expected from Facilities Engineering next month on four alternate organic cooled reactors upon which technical criteria have been prepared. Fuels Processing personnel are developing advanced slug fabrication cost schedules for use in this effort.

Radiological Engineering

Radiation Control Experience

No overexposures to radiation were received by IPD personnel during March. No radiation occurrences were formally investigated.

LAPSE OF RADIATION CONTROL
DISTRIBUTION BY REACTOR AND OPERATION

	B	C	D	DR	F	H	KE	KW	IPD Total
Processing	0	6	0	2	3	1	0	0	
Maintenance	0	1	1	0	0	4	0	0	
Supplemental Crews	0	1	0	0	0	1	0	0	
Radiation Monitoring	0	1	0	0	0	0	0	0	
Research & Engrg.	0	0	1	0	0	0	0	0	
Facilities Engrg.	0	0	0	1	0	0	0	0	
IPD Unassigned	0	0	0	0	0	1	1	1	
Totals	0	9	2	3	3	7	1	1	26
Non IPD			1						

Twenty-seven reports of Lapses of Radiation Control were issued during the month of March, of which 26 fell within the responsibility of the Irradiation Processing Department.

Contamination spread to skin, clothing, or to areas outside an existing Radiation Zone was the cause of 22 Reports of Lapses of Controls. This included eight cases of skin contamination, eight cases of clothing contamination, and six cases of the spread of radioactive material outside established Radiation Zone.

There were four cases where employees received uncontrolled exposure to radiation of such a magnitude as to be judged Lapses of Radiation Control.

Two Lapses of Control are of special interest. On two occasions, the rupture of cored slugs in the 105-C reactor was accompanied by a release of a sizeable quantity of gaseous fission products. These gases escaped from the 105-C effluent system from vents in the effluent line and caused high dose rates in 115 and 105-B buildings. On both occasions the burst of activity was of relatively short duration and was accompanied by personal contamination and surface contamination. These gases have been encountered in the storage areas following the discharge of ruptures, but have not been present in reactor cooling water in these concentrations prior to discharge of the rupture.

One of the Lapses of Control which occurred during March was judged a potential overexposure. Contamination was discovered on the sock of an employee when he left the work area radiation zone. Filming of this contamination revealed a dose rate of 5.7 mrads/minute. It is not known exactly when the employee became contaminated. The maximum possible dose this employee could have received was 1140 mrads to the skin of his foot.

Radiation Control Standards and Procedures

The manual of Radiation Control Standards and Procedures (HW-45674) was issued during the month; twenty-eight Standards and four Procedures have received necessary approvals and acceptances and are included. Eleven additional Standards and three Procedures have been prepared and circulated for approval. Radiation Monitoring Procedures are still being prepared.

Project Review

The Army gas loop, a nitrogen gas cooled recirculation facility was reviewed and found feasible on radiological grounds. The slug cutting and etching facility (Project CG-689) was also reviewed and detailed recommendations made for contamination control.

Reactor Purges

Reactor purges of short duration were monitored at C-Pile with the observation of small radiation level buildup under these conditions; as a result sampling of purge effluent may be discontinued for short duration purges.

The activity in the water and filters at the Pasco water plant filter beds resulting from a recent H-Pile purge was observed by Regional Monitoring, Hanford Laboratories. Significant increases in activity were observed and will need to be confirmed through more exhaustive future surveys.

PILE POWER LEVEL LIMITATION

Equilibrium pile power levels have been limited during February 1957 approximately as follows:

Pile	Limit	Basis
B	950 KW Maximum Tube Power	Slug Rupture Control - Planned Rise Program
C	920 KW Maximum Tube Power	Slug Rupture Control
D	Down for CG-558	
DR	1200 MW Total Power Level	Slug Rupture Control - Planned Rise Program
F	107 C Maximum Tube Outlet	Slug Rupture Control
H	105 C Maximum Tube Power	Slug Rupture Control
KE	1225 KW Maximum Tube Power	Slug Rupture Control - Planned Rise Program
KW	1225 KW Maximum Tube Power	Slug Rupture Control - Planned Rise Program

GENERAL PROCESS ENGINEERING

CG-558

Coverage was provided for D Pile during the current CG-558 outage. Preparation of procedures for the forthcoming F and H Pile outages is continuing.

Slug Rupture Control

An outbreak of split type slug ruptures in a localized region at C Pile occurred on March 15, 1957, after an all-HCR-out startup. In the startup the pile was held on TBI limits. At the C Reactor these limits are considerably above the rupture control point. Therefore powers above the rupture control point were obtained for a relatively short time. At the current 500 MWD/T goal exposure at C Reactor the evidence points to this being the primary cause of the outbreak. This appears to be the first evidence that at C power levels and exposures, levels above the rupture control point may not be exceeded for a short time. All metal in the affected region with exposures greater than 100 MWD/T was discharged.

This outbreak was followed by a similar one on March 30, 1957 in a different region for which there was no apparent single cause but which could have been a secondary result of the hot startup. The discharge of some 155 process tubes with exposures greater than 100 MWD/T in the affected area was recommended subsequent to the second outbreak. A total of nine split type slug ruptures were sustained during the two occurrences. To minimize the recurrence of such

outbreaks recommendations were submitted to C Processing Operation personnel to restrict tube powers in the near side of the pile, adjacent to the HCR pattern, during startups and to preferentially charge split rupture resistant material in this region.

Increased Flow at the K Piles

Tests to determine available flows and the effect on equipment of full-speed five-pump operation and six-pump operation were conducted during the month. Both tests were satisfactory and the results are being published.

Plugged Panellit Pressure Sensing Lines

The use of a rotameter for measuring water flow rates through Panellit sensing lines as a means of detecting plugged lines was recommended to the K Area Processing Operation.

WATER TREATMENT

The Columbia River was unusually muddy during late February and March. The maximum twenty-four hour average turbidity was approximately 950 ppm, while the previously recorded maximum was 360 ppm in 1948. It was found that Hanford water treatment techniques, i.e. very high treatment rates and novel control methods, were successful. After a short period of uncertainty in determining the proper alum and Separan feed for the unusually muddy water being treated, the water plants produced filtered water containing less than 0.005 ppm of turbidity.

The model filter plant and related tests were used in controlled experiments to develop data necessary to help guide large-plant operation and to improve operating methods.

PROCESS STANDARDS

Three revisions to Process Standards - Reactor, HW-33000, were issued during the month. These were:

Process Standard C-050 - "Graphite Temperature Limits"

This revision contains the complete requirements for graphite thermocouple stringers at F, H, KE and KW Reactors. Also, the Standard now contains specific instructions as to when the graphite temperature should be determined by using the $\triangle T$ of adjacent process tubes.

Process Standard K-010 - "1706 KER Recirculation Facility - General Requirements"

The Standard was revised to allow use of higher-than-normal process tube temperatures and pressures during operation of the KER recirculation facility. Appropriate safety trips, pressure tests and rechecks of system integrity were incorporated to minimize any risk to the reactor and personnel.

Process Standard K-020 - "1706 KER Recirculation Facility - Non-Fissionable Material"

This Standard was recirculated for approval to permit backprinting the correct basis. The basis for Standard K-010 was inadvertently backprinted on one page of Standard K-020.

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

Process Standard A-020 - "Process Water Temperature Limits"

The Standard was revised to permit use of a new method of calculating the high trip TBI limit, which will facilitate IBM programming of TBI calculations.

Process Standard A-040 - "Process Water Trip Settings"

The riser pressure (LP) trip specification was revised to permit a trip setting 70 psi below operating pressure at B Reactor to accommodate post CG-558 operating conditions.

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

When the old shield-cooling-water $\triangle T$ limit proved restrictive, the allowable $\triangle T$ was raised from 10° C to 15° C. Shield heating will still be well below damaging temperatures with the new $\triangle T$ limit. The Standard also allows an emergency shield cooling water $\triangle T$ limit of 20° C for the short period between failure of the normal shield water supply and establishment of the required pressure on the back-up system.

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

The Standard now requires that the B Reactor Ball 3X LLP trip be set 140 psi below the LP trip to accommodate post CG-558 conditions. A corresponding range for the Ball 3X time delay relay setting was also specified.

Five Process Change Authorizations were issued to permit temporary relaxations of the Process Standards. These were:

PCA #171 - "Emergency Steam Driven Pumps - 190-DR"

At DR Water Plant, 6 of the 13 secondary pumps were left non-motorized and in series with the emergency steam pumps, resulting in one-third less flow from each steam pump in series with a secondary pump. Therefore, to ensure adequate emergency process water supply at DR, the minimum number of steam pumps required in readiness during reactor operation was increased by this PCA from 7 on automatic to 9.

PCA #172 - "Water Pressure Trips - DR Reactor"

At DR Reactor, incremental increases in riser pressure to compensate for sloughing-off of process tube film resulted in a greater differential between normal riser pressure and the LP trips than allowed by Standards. The PCA authorized operation with this greater than normal differential until the next

outage. Reactor safety was not significantly involved since the reactor would be shut down by other trips before the riser pressure fell to the LP trip setting.

PCA #173 - "Handling of Unirradiated Enriched Slugs - C and H Reactors"

Current Standard requirements made it impossible to store both C and E enriched slugs in the metal storage room at the same time. This PCA provided the necessary relief in storage requirements so that all enriched metal currently being held at C and H Areas could be stored in the metal storage room. A procedure was included to ensure that this could be accomplished safely.

PCA #174 - "Graphite Temperature Limit - B Reactor"

As a result of a raise in power when there seemed to be ample room within graphite temperature limits, B Reactor exceeded limits by 15° C. This PCA authorized gradual reduction of graphite temperature to within limits over a period of four days to avoid the possibility of a gross temperature unbalance. It was stipulated that power level not be raised further until graphite temperature could be held within limits.

PCA #175 - "Shutdown Flow Monitoring - K Reactors"

This PCA extends the provisions of PCA #162 which expired February 28. The PCA allows removal of half of the K Reactor temperature monitor from service during shutdown to permit maintenance. The necessary revision to the Standard is in preparation.

Process Assistance

Auditing of conformance to Process Standards was resumed on March 15 when one engineer was again assigned to a staggered shift. This shift allows periodic coverage of all of the standard Processing Operation shifts.

Design Change #160 was prepared by Process Standards Operation to permit installation of 22 old B, D, F type stainless steel pigtails on C Reactor in connection with Project CG-651. This was necessary when it was found that the front ball valve connectors in the 112 tube block would rub on existing C Reactor pigtails.

Design Change #161 was prepared by Process Standards Operation to allow use of larger gauge wire in the Ball 3X circuit at B Reactor. Increasing the current carrying capacity of the wire and improving the wire connections will reduce the likelihood of circuit failures that could trip the Ball 3X System.

RUPTURE EXPERIENCE

Ruptured Slug Tabulation - March, 1957

Failure Date	Tube No.	Lot No.	Type Metal	Exposure	Type Failure
3-3-57	2275-H	M-225	8" Regular	505	Unclassified
3-4-57	0973-C*	N.A.	8" Regular	117	Unclassified
3-5-57	2485-DR	M-244	8" Regular	269	Unclassified
3-11-57	3665-C	K-421	8" Regular	469	Split L.
3-15-57	2461-C	K-480	8" Regular	400	Split L.
3-16-57	3664-C	Z-233	8" Reprocessed	500	Split L.
3-16-57	3662-C	K-447	8" Regular (Truline)	274	Split L.
3-16-57	3557-C	M-239	8" Regular	385	Split L.
3-16-57	3659-C	Z-220	8" Reprocessed	520	Split L.
3-16-57	3666-C	K-485	8" Regular	303	Split L.
3-16-57	3759-C	Z-230	8" Reprocessed	537	Split L.
3-17-57	3256-C	Z-226	8" Reprocessed	546	Split L.
3-17-57	4181-KE**	D-222	8" Cored	529	Cap
3-21-57	1964-F	Z-245	8" Regular	303	Side - Other
3-23-57	1080-C***	—	—	132	Unclassified
3-25-57	1587-C***	—	—	137	Unclassified
3-28-57	3472-C***	—	—	195	Unclassified
3-28-57	2670-KE	K-459	8" Regular	495	Split L.
3-28-57	0983-H	M-234	8" Regular	605	Side - Other
3-30-57	2466-C	K-497	8" Regular	405	Split L.
3-30-57	2361-C	K-480	8" Regular	464	Split L.
3-31-57	2359-C	K-480	8" Regular	446	Split L.
3-31-57	2464-C	K-497	8" Regular	395	Split L.

Failure was a regular metal control piece. Tube was loaded with alternate pieces of regular metal and M-388 jacketed metal charged under PT-IP-42A. Process tube was B, D, F type (small annulus).

** First 1/2 inch cored failure sustained at HAPO.

*** Failure was a 5/8" cored enriched uranium (1.44 per cent U-235) slug charged under PT-IP-30A.

Legend:

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

Side - Other - Failure probably caused by a localized corrosion penetration, e.g. pin hole penetration, or other unknown mechanism.

Cap - Failure occurred at cap (weld end) of the slug. May have been due to corrosion penetration or may have been due to uranium core dimensional changes that resulted in separation of the cap.

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

N. A. - Information not available.

OPERATIONAL PHYSICS OPERATION

PILE PHYSICS ASSISTANCE

Items of Particular Significance

A partial test of the proposed "low level quickie" discharge of ruptured slugs was performed at KW Pile on 3-25-57. It was demonstrated that the reactivity transient after a power reduction of about 99.9% can be controlled easily and that the power can be maintained constant at this low level within a few per cent. This technique could be used to permit the discharge of ruptured slugs with scram time savings of the order of 8-15 minutes; this extra time otherwise purchased with enrichment would cost Hanford several hundred thousand dollars per year. Further similar tests are planned for April at other reactors.

Because of the chronic shortage of reactivity at B Pile caused by in-pile exposure reductions and higher power operation associated with post CG-558 operation, the decision has been made to add about six columns of "C" metal enrichment in the near future. Similar plans will be made for D and F Reactors if the discharging cycle causes similar reactivity problems; at this time it does not appear that DR Pile will require enrichment until higher powers or lower exposures are achieved.

Table I below summarizes the pertinent operational physics information of the various piles; a more detailed report is given in the monthly "Reactivity Balance and Associated Reactor Physics Data" document.

TABLE I

SUMMARY OF OPERATING DATA OF PHYSICS INTEREST
FOR THE MONTH OF MARCH, 1957

Pile	B	C	D	DR	F	H	KE	KW
ECT*, March	1390	1550	(1)	1460	1300	1610	2400	2370
12 Mo. Avg. ECT	1277	1575	-	1410	1330	1560	2340	2365
Equil. Scram Time**	18	23-35	-	30-45	35-45	65	18-24	22-28
No. of Scrams and Recoveries***	7/4	6/3	-	4/0	2/1	0	3/1	5/4
No. of Non-Scram Outages	4	8	-	1	3	1	4	2

* Effective Central Tubes; this value is defined as the pile power divided by the average power 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, equilibrium or non-equilibrium, and "quickie" outages from equilibrium and from which recoveries were attempted.

(1) The D Pile CG-558 outage began 2-12-57 and will continue until about 4-1-57.

PILE PHYSICS ASSISTANCE (Continued)

B Pile - J. T. Worthington

Between Feb. 26 and March 8, B Pile had two scrams and one intentional brief outage, and another minimum outage was caused by a water leak. On March 8, a short circuit occurred in the system, and 28 channels of balls were dropped. During the outage for ball removal, 67 tubes were replaced and 22 Poison Column Control Facility tubes were reactivated. 23 of these tubes are now in use for operational charge-discharge of poison.

The PCCF tubes have increased the flattening from 1250 ECT to 1390, but the reactivity status of the pile has been so low as a result of successive discharges that scram time is very short. To keep enough excess reactivity in the control rods for adequate pile control of temperature distribution it has been necessary to take advantage of a temporary process change authorization and exceed the normal graphite temperature limits by 15 - 20° C.

Previous studies have indicated that at the expected post CG-558 power levels and at low in-pile uranium exposure values enrichment might be required. It is apparent that at a goal exposure of 500 MWD/T and a tube power of 950 KW/tube more reactivity is required for stable operation utilizing ball valve columns than is currently available. It is currently planned that about six columns of "C" metal enrichment will be added during the next outage.

C Pile - F. C. Franklin

As shown in Table I above, there were a very large number of outages at C Pile in March. Three attempts were made to recover after quickie rupture discharges; only one of these attempts was successful. The recovery was made with all rods out, and a severe flux distortion occurred. The power generation in some tubes in the top-near corner of the pile, although within TBI limits, exceeded the maximum equilibrium tube power by about fifteen per cent. The power generation of some slugs in tubes adjacent to equilibrium control rod positions may have exceeded the normal maximum equilibrium slug power by an additional ten per cent due to the low xenon production near the control rods during equilibrium. Production uranium ruptures occurred in six tubes, five within one lattice unit of the top rod bank and one within two lattice units of the top rod bank, either during or shortly after the recovery. Available data also indicate that the rate-of-rise of the power level in the range of 100 to 500 MW was fairly high.

The tube power limit during hot start-ups has been reduced temporarily to 920 KW if more than 100 inhours of rod are in the unit and to 810 KW if less than 100 inhours of rod are available. The rate of rise to the recovery level has been restricted to 50 MW per minute.

The total number of I & E charges in C Pile is now 196.

D Pile - G. R. Parkos

The pile was shut down during the entire report period for the CG-558 outage. A rough draft of HW-47622, "The Technique of Calculating Reactivity Transient Behavior at D Reactor", was completed. This document explains the method used to evaluate each of the items which contribute to pile reactivity and the method

PILE PHYSICS ASSISTANCE (Continued)

D Pile - G. R. Parkos (cont.)

used to calculate the net reactivity transients. Graphs of the calculated and observed reactivity for actual transients are included. The document should be issued in April.

The operation of D and DR Reactors during the quarter beginning April 1, 1957 was discussed with the D and DR Reactor Analysts. A rough draft was prepared which reports the physics aspects of the limits, special outages, special tests and operational difficulties anticipated at the D and DR Reactors during the quarter.

DR Pile - R. D. Carter

DR Reactor equilibrium power was limited to an arbitrary level imposed because of high top biological shield temperatures and the possibility of high rupture rates with higher tube powers.

The ECT for the month was achieved with no attempt to flatten with the PCCF during operation; the high value was due to the relative increase in fringe reactivity because of large central discharges.

Three unscheduled outages occurred during the month. On March 1, a faulty PCCF tube fitting caused a shutdown for the repair of the tube. A panellit scram prevented recovery on March 5, and a slug rupture occurred followed by a ruptured hose on an HCR when the rod was being pulled for the "quickie" recovery attempt. On March 10 an electrical power surge resulted in a scram, and a panellit scram after operation was resumed caused the recovery attempt to fail.

The top biological shield temperature reached 195 degrees centigrade during equilibrium operation. Since such temperatures will result in rapid deterioration of the biological shield, top fringe poison was charged in the first lattice unit during the outage of March 20 - 23 to reduce shield temperature. Enriched natural uranium was charged in the 3rd lattice unit to regain in part the reactivity lost; additional enrichment will be loaded during a subsequent outage to compensate fully the fringe poison loading.

F Pile - D. E. Simpson

The maximum power level attained was approximately 2% lower than the new high attained in February; the decrease was due primarily to a reduction of about 2 per cent in the recorded total water flow. Following a quickie outage on March 17, the level could not be held due to insufficient reactivity, and the recovery attempt was unsuccessful.

The proportional counter failed to function during the start-up of March 18. It was found that the cold start-up chamber, the coaxial switch, and the scaler were all faulty. The chamber was replaced, a spare scaler was installed, and the coaxial switch was by-passed to permit use of the equipment during subsequent start-ups. The scaler is now being repaired, and it is planned to install a pre-amplifier for each chamber with separate leads to the control room in order to eliminate the coaxial switch.

PILE PHYSICS ASSISTANCE (Continued)

F Pile - D. E. Simpson (cont.)

The reactor was shut down on March 25 for Project CG-558. The relatively light discharge scheduled during this outage will not have an appreciable reactivity effect. The majority of the PCCF columns will be held out for supplementary control rather than being charged with uranium.

H Pile - G. R. Gallagher - C. E. Bowers

H Pile enjoyed continuous operation throughout the report period after the start-up on March 10. A new high power level was attained on March 18, and a new high E. C. T. of 1610 was calculated on March 25.

The "E for C" program is advancing fairly rapidly, 41 columns of E metal having been loaded during March to supplement the 2 columns already in the pile. Future plans are to discharge the remaining "C" metal columns as they become depleted and replace them with "E" metal on a routine basis. The reactivity effect of the changeover is approximately as expected, and the degree of success of this replacement program is indicated by the high flattening efficiency.

On March 5, VSR #51 was examined to determine why it would not enter the pile. The rod had been "tied out" since February. A large split was observed about 11' from the tip of the rod in the next-to-bottom section (the rod is made up of 10' sections).

The rod is made up of a polyethylene center portion in a 1/32" wall tubular aluminum jacket, around which is packed approximately 1/4" of amorphous boron powder. The boron is enclosed by an outer jacket of 3/32" stainless steel. The split was approximately 1' long and up to 1/2" wide. Operation after the rod was replaced and the channel vacuum cleaned showed no evidence of appreciable boron remaining in the pile. The damage is assumed to be the result of the polyethylene center either swelling due to radiation and/or heat or releasing hydrogen as a result of excessive heat. It is interesting to note that all other VSR's were carefully examined with no signs of similar damage. The problem of re-design of the H and DR type rods to preclude high temperature problems was already under study at the time this failure was observed.

A new #1 Galvanometer chamber was installed during the last outage; a sensitivity check during the subsequent start-up indicated it to be well within the requirements of the Process Standards.

KE Pile - W. S. Nechodom

The achieved increase in power level of approximately 2 1/2% over the previous record is primarily associated with an increase in flattening efficiency.

The reactor was scrammed from equilibrium on March 6; probable cause of the scram was the failure of the latch mechanism on VSR 37, allowing the rod to drop into the unit. This VSR would not latch during the recovery attempt, and recovery was not effected. An equilibrium scram occurred on March 11, when the instrument power supply alternator failed. A low level period trip was obtained

PILE PHYSICS ASSISTANCE (Continued)

KE Pile - W. S. Nechodom (Cont.)

during the recovery attempt; however, the elapsed time before first indication was such that recovery could not have been successful even without the period trip. Data indicate that the trip was caused by a rising period of approximately 15 seconds.

The reactor was shut down on March 17, to investigate rupture indications and discharge a ruptured slug from 4181 KE.

During the start-up on March 18 the PC,while switched to the most sensitive (cold) chamber, gave spurious indications of rising periods, tripping the No. 1 safety circuit and delaying start-up. Start-up was made using the least sensitive (hot) chamber for period trip coverage. The start-up was made without incident, as was a subsequent non-equilibrium scram recovery. Sensitivity of the hot PC chamber was found to be between 100 and 700 watts on the initial cold start-up and about 1000 watts on the secondary cold start-up. First indication was obtained on the cold start-up with a 40 ih rising period; HCRs were being withdrawn at the standard rate of 20 ih/5 minutes. Subsequent checking of the PC instrumentation has not revealed the cause of the spurious trips, and further work will be done during the next outage.

KW Pile - D. E. Goins

On March 1, KW Reactor was scrammed when an instrument man was replacing a neon bulb on the No. 1 Beckman after completing a similar replacement on the No. 3 Beckman. The cause of the scram has not been determined. Scram recovery was successful.

A severe heat cycle started on March 6, which necessitated manually scramming the reactor. Since the pile had been at equilibrium for some time, the operational difficulty does not appear to have been one of general instability.

Three Panellit scrams occurred on March 9, due to grounding of the Panellit circuit. Two fast period PC trips and one Beckman trip occurred during the start-up attempt after the second panellit scram. Scram recoveries were successful in all cases.

Erratic PC behavior was observed during the scram recovery attempts earlier this month. The fault is believed to be in the PC chambers since their plateaus have shifted significantly during the last three months. The chambers are scheduled for replacement during the March 25 outage, and a start-up instrument sensitivity check is planned for start-up following the outage.

A partial test of the low level "quickie" proposal was made at the beginning of the 3-25-57 outage. The reactor was shut down to a power level of approximately one megawatt with the horizontal rods, then held at that level as long as possible by pulling the HCR's. The main purpose of the test was to determine the magnitude of the control problem following a sudden reduction of power of about 99.9%. The test demonstrated that the control problem was small and also provided useful data for analyzing the scram transient and comparing control rod values. A more complete description of the results will be provided at a later date.

PROCESS PHYSICS STUDIES

Shield Protection Studies

Because of the unexpectedly high top biological shield temperatures observed recently at the DR Pile, the fringe poison test under preparation was altered on short notice to permit heavy poisoning of the DR pile top fringe. The test pattern loaded during the month consists of 20 full length mint columns in the 46 row and 20 full length E columns in the 44 row. Although maximum top biological shield temperatures were reduced from 195° C to 135°C, a portion of this reduction must be attributed to a general flux distortion due to under-enrichment in compensating for the fringe poison load. Results of this fringe poison effort can be better assessed following the next DR Pile outage when enrichment will be loaded in the 43rd lattice unit to balance top to bottom flux distribution.

B Pile top shield temperatures are reaching a maximum of 130°C with no fringe poison. Temperature observations to date at B and DR Piles would indicate that the H Pile top biological shield temperatures are probably excessive and that fringe poison will be necessary in the top of H Pile as soon as it comes up from its CG-558 outage.

E for C Testing - PT IP-20-AC

Forty-one "E" columns of 0.94% U-235 content were charged into the H Reactor, replacing 14 depleted "C" columns. All but three of the "C" columns in the top enrichment perimeter have now been replaced with E metal. Flux distribution and reactivity data indicate that the proper replacement ratio is approximately that expected: three "E" columns for one green "C" column, or two "E" columns for one depleted (40% burnout) "C" column.

Safety Control Capacity Studies

In general, it is advantageous for flux distribution control to load enrichment much more heavily on the near side, but the total number of enrichment columns allowed is reduced by this procedure.

The problem of determining limits for loading enrichment in an unbalanced array has been simplified. A plot of results from a limited number of K reactor cases indicated a near linear relationship between total number of enrichment columns allowed and the ratio of light side to dense side columns.

Horizontal Rod Calibrations

A production test for calibrating the portion of the K Pile HCR system employed in the present equilibrium configuration is currently being circulated in rough draft form for comment. The proposed test would require two to three shifts of operating time, relying on the initial start-up total calibration for tying the partial calibration to the entire system.

Refinement of the H Pile calibration results obtained in January are continuing. Total system strength appears to be about five per cent greater than estimated from initial raw data.

PROCESS PHYSICS STUDIES (Continued)

Supplementary Control

Liaison continued during the month with Facilities Engineering and with Plant personnel in expediting the testing and procurement of poison spline equipment. A joint authorship production test for testing a winch-operated poison displacement facility is in rough draft form.

Operating Efficiency Data

Average values of potential gains from improving flattening and rod control and non-equilibrium losses were lower during the report period than during the previous month. However, a factor which may be misleading is the elimination of conservatism in rod control since reactors are operating on arbitrary rupture limits rather than on fixed flow instability limits.

The large non-equilibrium losses shown for the DR Pile are from four start-ups including an initial large loss on its post CG-558 start-up. Several scrams during a cold start-up at the KW reactor contributed to its large non-equilibrium losses.

TABLE II

POTENTIAL GAINS(1) - OPERATIONAL PHYSICS ASPECTS
FEBRUARY 16, 1957 THROUGH MARCH 15, 1957

Reactor	B	C	D[5]	DR[6]	F	H	KE	KW	AVERAGE[7]
Equil. Pot.									
Flattening[2]	4.4	4.5		0.0	2.8	4.1	3.5	4.5	4.0
Rod Control[3]	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total, Existing Limits	4.4	4.5		0.0	2.8	4.1	3.5	4.5	4.0
Non-Equil. Pot.									
Operating Losses[4]	4.4	4.4		7.6	1.8	2.1	5.0	6.6	4.6
Temp. "P" Outages	0.0	0.0		0.0	2.1	0.7	0.0	0.0	0.4
Total, Start-Up Control	4.4	4.4		7.6	3.9	2.8	5.0	7.4	5.0

1. The bases for determining these factors are contained in HW-47602.
2. Per cent to be gained if desired flattening changes could be made.
3. Per cent to be gained by having most limiting tube in each rod control region on limits. All reactors are currently operating on an arbitrary limit imposed by fuel element failure rates rather than an absolute limit (as TBI) beyond which operation is not permitted. For this reason the normal conservatism of operating a safe distance below limits is no longer necessary; therefore, each reactor is currently operating on its prescribed rupture limit. The "Rod Control" potential gain will not be included in future reports until it again becomes a significant consideration.
4. Per cent of non-equilibrium losses relative to 28 days at full level.
5. D Reactor was down for the CG-558 outage during the report period.
6. DR Reactor operated on an arbitrary total power level limit following start-up after completing its CG-558 outage; for this reason no flattening potential gain could be assigned.
7. Equilibrium averages exclude D and DR Reactors. Non-equilibrium averages exclude D Reactor.

PROCESS PHYSICS STUDIES (Continued)

Significant Operational Physics Documents Issued During the Month

1. HW-46165 Rev., "PT IP-14-AC Use of E Metal in Shield Protection", W.L. Bunch and L. W. Lang, 3-6-57, Secret.

2. HW-47625, "The Technique of Calculating Reactivity Transient Behavior at KE Reactor", W. S. Nechodom, 2-25-57, Secret.

3. HW-47626, "The Technique of Calculating Reactivity Transient Behavior at KW Reactor", R. D. Carter, 3-12-57, Secret.

4. HW-48760,* "Experimental Checks on One-Group Multi-Region Control System Calculations", C. L. Miller, March 5, 1957, Secret.

5. HW-48761, * "Calibration of Large Control Systems by Danger Coefficient Techniques, G. C. Fullmer, March 5, 1957, Secret.

6. HW-48833, "Anticipated F Pile Reactivity Status Following Project CG-558", D. E. Simpson, 3-15-57, Secret.

7. HW-48841, "Reactivity Balance and Associated Reactor Physics Data, February 1957", S. R. Stamp, 3-1-57, Secret.

8. HW-48911, "Reactor Neutron Flux Sensitivities, Interim Report No. 3 - Production Test IP-7-C, Period July, 1956 through February, 1957", C. E. Bowers, 3-6-57, Secret.

* Talks presented at AEC meeting on Reactor Control. File copies only.

NEUTRON FLUX STUDIES

A series of four experiments were performed in the Hanford Test Reactor to evaluate the neutron moderation effect of cooling water in the KAPL 120 Loop. Radial thermal neutron flux traverses were performed by the activation of copper foil detectors in a two foot long mock-up of the KAPL 120 Loop liners. The flux depression in an adjacent uranium column was determined by the activation of copper foil detectors attached to the surface of the uranium slugs. The following traverses were obtained:

1. Flux traverses with no fuel and no water in the liners.
2. Flux traverses with no fuel but with water at room temperature in the liners.
3. Flux traverses with a DO slug fuel loading in the liners but no water.
4. Flux traverses with a DO slug fuel loading and water in the liners.

Preliminary findings from this study may be summarized as follows:

1. With no fuel, an 18 per cent decrease in thermal flux can be expected when the loop water temperature is raised from room temperature to 600 F.
2. With a DO-type fuel load in the loop, a 7 per cent decrease in thermal flux can be expected when the loop water temperature is raised from room temperature to 600 F.

RECIRCULATING GAS LOOP

The detailed design of the Army Recirculating Gas Loop is 96 per cent complete. The official notification of the approval for construction has been received by the Hanford Operations Office. The expenditure of $135,000 and the commitment of an additional $115,000 for construction during the current fiscal year have been approved.

An analysis of the radiological hazards presented by the release of fission products from a ruptured fuel element has been completed. The information obtained from GE-ANP experience with a single pass, air-cooled facility in the MTR has established these important facts:

1. The activity release is stopped by lowering the fuel element temperature.
2. The released products are apparently all gaseous.
3. Some plating of short half-life (30 minutes) activity occurs on down stream piping.
4. No contamination of the building air has been detected at the MTR following an activity release within the test assembly.

As a result of the study, no protective measures, beyond those originally planned, will be taken. The original, applicable design features are:

1. Gamma and neutron shielding around the exterior portion of the in-pile tube and the equivalent of 4" of lead shielding around all active portions of the Loop.
2. Radiation detection devices with alarms for X_0, X_1 and X_2 levels.
3. Gamma monitoring at selected points on the loop piping for rupture detection.
4. Continuous sampling of the air at selected X_1 level locations using a Kanne Chamber.

IN-PILE EXPERIMENTS

Two assemblies designed to measure the reaction between zirconium and pile gas impurities (HAPO-105) were discharged from F reactor.

The Organic Loop Mark II (ORAII) continued to operate in the 2A test hole at KE reactor. An apparatus for irradiating organic liquids (HAPO-209) in the Snout Facility at KW reactor is being assembled by the customer. This experiment uses gamma heaters and is expected to operate in the range of 350-475 C. The apparatus will be charged as soon as possible after assembly.

The fabrication of components necessary to mock-up the K Snout Facility for flow tests was completed. This mock-up is required to establish heat transfer conditions associated with the low temperature irradiation of uranium wafer assemblies (HAPO-173) in support of an HLO research program.

HAPO FUEL ELEMENT IRRADIATIONS

The coolant channels of nine I & E loaded tubes are being monitored at C reactor.(HAPO-159). Two of the nine tubes are new. The ribs in one of the new tubes are of standard height; the ribs in the other tube have been reduced by 20 mils. The ratios of ΔT across the top of the slug column to the ΔT across the bottom of the slug column are 2.3 and 1.1, respectively.

The irradiation of three cored, insulated, natural uranium fuel elements (HAPO-195) in KW reactor continued without incident. The accumulated exposure as of March 20, was 58 per cent of goal.

The two seven-rod cluster fuel elements (HAPO-195) and the three IPR fuel elements (HAPO-196) were charged into the front-to-rear test holes of KE reactor. The accumulated exposure as of March 20, was approximately 22 per cent of goal.

OTHER IRRADIATION TESTS

1. Two graphite boats (HAPO-177) were charged into the Y test hole (Hot Graphite Facility) at C pile.
2. A total of seventeen sets of activation analysis samples were irradiated in the Poison Column Control facilities at DR pile. These samples are identified as follows:

   a. Ten sets of HAPO 184 samples in support of a Washington Designated Program assigned to ELO.
   b. Six sets of HAPO 166 samples to support a study of the diffusion rates of rare gases in uranium.
   c. One set of HAPO-202 samples supporting a study of impurities in candidate organic coolants.

3. Two samples of UO_3 (HAPO-203) were irradiated in the Quickie Facility (E test hole) at F pile, at the request of Chemical Research personnel, to provide a source of Np^{239} tracer.
4. Three samples of stainless steel (HAPO-211) were charged into the Quickie Facility at F pile to provide material for activation analyses.
5. One effluent water residue sample (HAPO-172) was irradiated in the Quickie Facility.
6. Fifty-one samples began exposure and seventy-two samples completed exposure in the F area gamma facilities (HAPO-171,148,207). Included in these irradiations was a 20-year equivalent rear face dose to candidate connecting cable and potting material associated with proposed temperature sensing devices.
7. Five AF-100 canisters began exposure and three canisters completed exposure in the KE gamma facilities.

TEST FACILITIES

1. The obstruction in the Y test hole (Hot Graphite Facility) at C pile was cleared and the facility was returned to service. The obstruction, which was removed by vacuum cleaning, has not been identified as yet.
2. Further study has shown that the difficulty (the outer tube's being one inch too short) with the 2A test hole at KE was due to an individual rather than a systematic error. The 2A facility was repaired by installing a thinner adapter flange between the nozzle and the pile. All the side-to-side tubes will be checked during subsequent reactor outages and a correction for tube length will be made wherever it is required; during these examinations, the present neoprene "O" rings will be replaced with the longer-lived Buna N rings.
3. Two of the stuck shield plugs which had been removed from 3674 KE (front-to-rear test hole) were taken to 189-D for examination. A preliminary study has indicated that the difficulty could have been caused by the formation of a heavy aluminum oxide corrosion film on the bottom surface of the plugs; a small amount of stagnant water was in the tube during part of the operating period.
4. Arrangments have been made to have the Co-60 pieces shipped from F area storage basin (F Area Gamma Facility) to the KE storage basin. This material will be permanently installed with new irradiation tubes in the KE basin.

Two irradiation tubes will be retained in the F basin for use with irradiated fuel slugs as the gamma source.

5. The winches required to complete the Air Force Gamma Facility in KE basin have arrived and are being installed.
6. The re-design of the Hanford Cobalt Facility has been completed and sent to Drafting for detailed shop drawings.

BORESCOPING

VSR Channel #51 at H pile was borescoped on 3-5-57, to determine the cause of operational difficulties which had been experienced with the rod. The following observations were made:

1. The channel condition was satisfactory down to 20'.
2. At 20' to 21' the filler block protruded into the channel approximately 1-1½".
3. A small shift of about 1/2" was noted on the row above and below.
4. The vertical keys were sheared in the 20' to 21' area and the ends of the filler blocks cracked.

The channel was borescoped again on 3-6-57, after some "chiseling" had been done on the ends of the protruding blocks. A final borescope inspection on 3-7-57 revealed that the channel was sufficiently clear to permit rod operation.

Replacement Thermocouple Channel #5, at 105 KE was borescoped on 3-7-57, at the request of the Instrument Maintenance, after an unsuccessful attempt to charge the new stringer. The examination revealed that the end of the entry block 72" from the pile face was cracked and that small graphite chips were wedged between the entry block and the gun barrel. These chips were removed and further examination revealed the channel to be clear.

RT Channel #9, at KW pile was borescoped on 3-7-57, to determine the condition of the channel prior to charging a new stringer. Small graphite chips and dust were noted throughout the channel. The block alingment, however, appeared to be good throughout the length (35') of channel which was inspected.

VERTICAL BOWING MEASUREMENTS

Area	Date	Tube#	Results
100 D	3-17-57	*4453 Front	Down .06"at 10' since 1-15-57 Down .13"at 18' since 1-15-57
100 D	3-17-57	*4674 Front	Down .03"at 10' since 1-15-57 Down .10"at 20' since 1-15-57
100 D	3-17-57	*4494 Front	Down .05"at 10' since 1-15-57 Down .19"at 20' since 1-15-57

*New Process Tubes were installed in these channels just prior to traversing.

COOLANT TESTING OPERATION

The 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 KER Loops 2, 3 and 4 for in-pile operation.

1706-KE SINGLE PASS TUBES

Tube 2943-KE was started up on high temperature single pass operation, with dummies, under Production Test 550-E, Supplement A, on March 2, 1957. A heat exchanger has been provided in the inlet piping to raise the temperature of the coolant entering the tube.

Modification of the outlet piping of tube 3043-KE has been completed to allow for high temperature liquid phase operation with fuel elements. The work was completed by Minor Construction with the exclusive use of unscheduled reactor outage time. The tube will not be operational until a satisfactory zircaloy tube has been procured and installed in the reactor.

ELMO LOOPS

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

ELMO-1 - A new loop installed by Minor Construction during the month. The loop was installed and will be operated as Development Test #63, under the CG 654 program. The purpose of the loop is to evaluate scale formation in heat exchangers, using raw river water.

ELMO-5 - A Westinghouse canned motor pump was installed to replace the Bingham mechanical seal pump which was returned to the vendor for repairs. During shakedown runs, on March 31, 1957, a section of tube containing immersion heating elements ruptured. The incident will be investigated as a near serious accident.

ELMO-7 - Installation of the PRPR fuel element vertical test section was completed during the month. The facility provides 150 gpm at 600F to a stainless steel tube of PRPR geometry. Initial tests will include flow stability characteristics, film disposition and corrosion effects for a 19 element dummy fuel cluster.

ORGANIC PROGRAM

ORA Loops

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

ORA-2 - Modification of the mechanical stops on the test hole annulus cooling tubes was completed and the loop reactivated on March 12. MIPB, at tar concentrations of 40-50%, was recirculated to evaluate the apparent increase in viscosity for a given percentage of tar. The eighth and last run with MIPB, was completed March 28. The equipment is on standby for subsequent tests involving the irradiation of a mixture of terphenyls.

Radiation Monitoring has reported general low energy beta contamination in the vicinity of the loop. The contamination has been tentatively identified as tritium. Analysis of the organic gaseous decomposition products has revealed tritium concentrations of 6x10-5 uc/l.

Conversion of KER Loop #1 to Organics

Work accomplished during March was as follows:

1. Final prints have been issued for the still, degasifier, and still pad.

2. Comment prints for instrument electrical piping details and piping schematics were completed and have been distributed.

3. The still pad has been installed and an access hole has been cut into Cell #1.

Allied Activities

During the month, irradiated MIPB has been shipped off-plant for supplementary analysis and experimentation as follows:

1. Naval Research Laboratories, Washington D. C., 25 gallons.

2. California Research Corporation, 2 gallons.

3. University of Rochester, 1 gallon (Atomic Energy Commission request).

KER FACILITY

The Coolant Testing Operation accepted using responsibility for the facility on March 14, 1957. The facility was accepted with a number of exceptions. KER Loop #3 was started up for in-pile recirculation with dummies on March 12 at operating pressures of 850 psi and temperatures to 125°C. Following a Westinghouse canned motor pump failure on March 23, operation was continued with one pump until the KE reactor outage of March 28, when the tube was returned to single pass operation. The failure, caused by fracture of an upper bearing, is within the guarantee period for the pumps and the problem has been referred to Westinghouse for action. The failure, which occurred after 1100 hours of operation, is the second bearing failure in two months.

In-pile recirculation with KER loops 2 and 4 was initiated following the KE reactor start-up of March 31.

The Swartwout Company has provided replacement condensers for the system controllers. The controllers are being repaired on an "as available" basis by plant forces.

The reactor would have been scrammed a total of four times during the period of March 12 through March 28 if KER safety circuitry had not been on by-pass. One scram would have been caused by the canned motor pump failure and three by pulses in the delayed neutron rupture detection instrumentation. Three major difficulties must be resolved before in-pile recirculation with heavy metal is initiated:

1. Correct voltage fluctuation and transfer time in the constant voltage instrument supply system.

2. Eliminate the pulses caused by pick-up of outside signals in the delayed neutron rupture detection instrumentation.

3. Replace the faulty condensers in the Swartwout controllers.

COMPONENT TESTING OPERATION

IRRADIATED MATERIAL EXAMINATION

Detailed examination of forty-two tubes of irradiated metal was completed during the month, seventeen of which required only visual examination.

PROCESS TUBE CORROSION MONITORING PROGRAM

Twelve pile process tubes were examined in the basin facilities and the Metallurgical Laboratory during the month.

In-Pile measurements of 136 process tubes were made using the Probolog. At H-Reactor 74 tubes were measured to determine exactly which tubes should be replaced and as a result 23 tubes were not removed. At B-Reactor certain tubes were selected from the removal list to determine if it was necessary to remove them; of the 38 tubes measured 13 tubes did not have to be removed. Twenty tubes were measured at DR-Reactor. None of these tubes were scheduled for replacement but the goal is to have in-pile measurements of 100 tubes by July 1, 1957, in order to prevent replacement of tubes with walls thicker than the goal for replacement. Listed below are number of tubes measured per reactor and unclassified document numbers of the reports:

Reactor	No. Tubes	Document Number
H-Pile	74	Report No. 43 - HW-48994
B-Pile	39	Report No. 44 - HW-49090
DR-Pile	20	Report No. 45 - HW-49428
C-Pile	3 (waiting for more tubes)	

PANELLIT GAUGES

Failure analysis was performed on 115 Panellit gauges and 2244 gauges were inspected and approved for installation; 2050 of these were for the D-Area CG-558 outages.

The Master Drawing List, repair and calibration activities and spare parts for the Panellit gauge standardization program is 25% complete. During the interim period this Operation will furnish Project Maintenance Operation with all approved changes in specifications over and above those currently shown on the Master Drawing List.

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 March 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	

O. H. Greager

MANAGER, RESEARCH AND ENGINEERING
IRRADIATION PROCESSING DEPARTMENT

PRODUCTION AND REACTOR OPERATIONS SUMMARY
MARCH, 1957

Input production (Pu) for March was 101 percent of forecast. The above forecast average operating power level more than offset a below forecast time operated efficiency. Record production was achieved at KW, exceeding their previous maximum 4.3 percent.

Output production for March was 109 percent of forecast due to discharges during unscheduled outages late in the month.

The maximum established power levels (including burnout) were increased 185 units at B, 75 at KE, and ten each at DR and H. The increase at B Reactor was due to the relaxation of tube power limits and continued gains from increased cooling water following the installation of CG-558 facilities; at KE to improved flattening resulting from charging a curtain of cored slugs in the far-side fringe; at DR to further gains following CG-558; and at H to improved flattening made possible by the replacement of depleted fringe enrichment.

Fifty-two reactor outages, of which 24 were scrams, resulted in an overall time operated efficiency of 64.2 percent which includes 22 outage days at D Reactor for CG-558 work. Forecast was 68.0 percent. Time lost for rupture removals, recovery of 3X system balls at B Reactor, and tube replacement exceeded that gained by postponement of a seven-day CG-651 outage at C Reactor.

Twenty-four ruptures of slug jackets during March required 167.1 reactor outage hours for removal. Twenty of these were regular metal, including one charged on a Production Test; three were Production Test cored E metal (5/8" core) and one was 1/2" cored regular metal. Fifteen of the regular metal failures were at C, two at H, and one each at DR, F and KE. The three 5/8" cored Production Test ruptures were at C and the 1/2" cored regular metal rupture was at KE. Three of the ruptures were removed by the "quickie" method.

Tube replacement outages were conducted at B, D, F and H Reactors. Sixty-seven regular tubes were replaced at B, 80 at F, and 52 at H. Nine problem tubes were removed and replaced at D and five at H.

Columbia River turbidity reached an all-time high of 1620 ppm early in the month. Satisfactory process water quality was maintained throughout this difficult period by appropriate modifications of treatment.

Significant items of equipment experience during the month, other than the CG-558 outage at D Reactor, were: (1) A complete ball drop at B Reactor was caused by a short in the Ball 3X hopper solenoid circuit. (2) Extensive cavitation damage was discovered in the suction vanes of the primary impeller of all process pumps recently installed in 190-B Annex under CG-558. (3) Ground settling around DR Reactor continues to be observed. During the month, settling became apparent in the monitor room and lunch room areas. (4) A river pump at KW was pulled and given a Class A overhaul. This was the first overhaul of this type pump since K start-up. (5) Eight reactor water leaks were corrected during the month. Four

were leaks in "O" ring seals on special rear nozzles at F, two were tube leaks (C and H), and two were Van Stone leaks (B and F).

There were no disabling injuries or formally investigated radiation incidents during March. Two security violations (open document files) occurred.

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

[redacted]

HW-43205 DEL

DECLASSIFIED

B-C REACTOR OPERATION

MARCH, 1957

GENERAL

I. Responsibility

Assigned responsibilities of the B-C Reactor Operation remained unchanged during March.

II. Organization

J.C. Cobb, Supervisor-100 Operations II, was transferred from B Processing Operation to C Processing Operation. L.B. Ufkes Engineer, was transferred from Operational Physics Operation to B Processing Operation as Supervisor 100 Operations II (Extra Coverage). M.W. Marquard, Supervisor 100 Operations II (Extra Coverage), was transferred from B Processing Operation to Supplemental Crews. W.I. Tatro, Maintenance Operation was promoted from Supervisor-in-training to Supervisor-Maintenance I, effective March 1. C.G. Brenner C Processing Operation, was promoted from Supervisor-in-training to Supervisor-100 Operations II, effective March 1.

III. Force Report

	February 28			March 31			Net Change of Total
	NE	E	TOTAL	NE	E	TOTAL	
General	1	1	2	1	1	2	0
P.A. & P.D. Operation	2	3	5	2	3	5	0
B Processing Operation	35	8	43	35	9	44	+ 1
C Processing Operation	33	8	41	31	8	39	- 2
Power Operation	106	13	119	103	13	116	- 3
Radiation Monitoring Operation	19	5	24	21	5	26	+ 2
Maintenance Operation	114	21	135	114	22	136	+ 1
Total	310	59	369	307	61	368	- 1

Personnel changes during March included two promotions from the nonexempt to the exempt roll, two deactivations, seven transfers out and eight transfers in.

IV. Safety & Security Experience

There were 21 medical treatments and no disabling injuries reported during March. One security violation was incurred for an open document file.

V. Personnel Activities

Eleven B-C Reactor Operation personnel attended an information meeting held at B Area by the IPD General Manager.

A total of 42 personnel attended radiation training meetings.

Five B-C Reactor Operation Manager Development training meetings were held during the month with 47 people attending.

VI. Non-Routine Reports Issued

"Incident Investigation, Electrical Failure - Ball 3X System, 105-B Building" - A.R. Maguire to A.B. Greninger, dated March 28, 1957.

VII. 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.

B-C ADMINISTRATION AND PERSONNEL DEVELOPMENT OPERATION

I. Administration Activities

Top Secret clearances were requested for about 50 percent of B-C personnel, to comply with the new AEC security ruling. Designation of ten additional file cabinets as Top Secret repositories was also requested.

Security clearance restrictions to the 108-B Area were removed following confirmation from Security Audit and Investigations Operation that an "exclusion area" status no longer applies to the 108-B Building. However, access to the building itself remained under control of the Property Management Custodian due to the "standby" status of the facility.

A new Advice on procurement, transfer and reclassification of Power personnel was prepared, circulated for comments, revised and submitted to Financial Operation for issuance.

The Maintenance Supervisors Position Description assigned to B-C Reactor Operation for revision was re-written and circulated to affected components for comments. The primary purpose of the revision program is to provide separate descriptions and evaluations for each position in lieu of the present consolidations.

II. Personnel Development

The last in the series of material on the Work of a Professional Manager was issued for the B-C Manager Development Source Books. The subject treated was Measurements. In addition, copies of an article covering goal-setting practices and methods for achieving goals were issued to all B-C exempt personnel. A series of five classes by C.E. Harkins on Safety and Housekeeping was concluded, and a second series on Measurements by G.S. Spencer was begun. These classes are part of the B-C Manager Development Program.

III. Cost Control Activities

The last phase of the FY-1958 and 1959 Budgets was completed and submitted for final review and approval.

IV. Landlord Activities

A survey and report was made of Ladies Restrooms in B Area to determine the adequacy and standards of the existing facilities. Results of the survey indicated that the major problem in B-C Area is the lack of facilities in the 1707-B (Engineer offices) and 1717-B (Maintenance shop and offices) buildings.

B PROCESSING OPERATION

I. Production

B Reactor achieved new maximum operating level and daily production records during the month. The new highs exceeded the previous records by 185 units in both categories.

Input production (Pu) for March was 78.3 percent of forecast due to the occurrence of a complete 3X Ball drop on March 8. Flattening changes made in February resulted in new high levels, but the extensive ball removal and tube replacement outage precluded realization of any production gains. Graphite temperature also became limiting and required relaxation through a Process Change Authorization, to permit higher levels.

II. Operating Experience

A. Operating Continuity

The reactor was down at the start of the month as a result of a water leak. There were five subsequent unscheduled outages as follows:

Date	Cause	Outage Hours
* 3-1-57	Water leak in tube 3581-B	9.0
3-2-57	Shut down to open 3 closed sample lines on rear	.4
3-8-57	Ball removal tube replacement and charge-discharge	257.2
3-20-57	Scram - Gauge 4564 (leaking Bourdon tube)	.6
3-21-57	Scram, row 24 (gauge 2453, suspected but not confirmed)	.4
3-22-57	Scram caused by unexplained trip on Panellit row 06. Reactor remained down due to insufficient reactivity for recovery.	31.2
	Total Outage Hours	298.9

* Outage initiated February 28.

The reactor was down at the beginning of the month on a water leak outage that had been initiated on February 28, at 4:38 a.m. Tube 3581 was found leaking at the front Van Stone. This tube was comparatively new, having been replaced in October 1956. After setting the tube up as an air tube, operation was resumed at 9:00 a.m. on March 1, 1957 after an outage of 28.4 hours. Of this outage time 9 hours were charged to March.

On March 8, 1957 at 11:10 a.m., a short occurred in the Ball 3X electrical system resulting in an immediate scram, dropping all hoppers of balls, except a portion of No. 35, into the VSR channels. Details of the ball outage have been reported separately in a letter from A.R. Maguire to A.B. Greninger entitled "Incident Investigation, Electrical Failure Ball 3X System, 105-B Building". The removal of the balls and refilling of the ball hoppers was accomplished by 8:00 a.m. on March 15 1957. The completion of acceptance tests on the rewired section of the Ball 3X circuitry and performance of other scheduled and forecasted (reactor and water plant) maintenance kept the reactor down until 4:30 a.m., March 19 1957. This concluded an outage of 257.3 hours.

B. Equipment Experience

In conjunction with the ball recovery operation, 67 process tubes were replaced. Of 39 tubes probologged, 14 were found acceptable from a wall thickness standpoint. In addition, 80 zone III orifices were changed to zone II. This eliminated a critical flow condition and provided better cooling for tubes that were limiting.

During startup preparation from the ball recovery and tube replacement outage, Ball 3X hopper No. 24 dropped its ball charge due to a sheared pin on the test gate.

C. Other

The weakened section of crossover line between the near rear riser and the downcomer was replaced by Construction forces. Also, 23 front face ball valves were installed on Poison Column Control tubes and the facility was made operable.

III. Improvement Experience

A. Projects

Projects active at B Reactor during March were: CG-558-"Reactor Plant Modification for Increased Production" CG-666-"Zone Temperature Monitor", CG-669-"Fresh Air System", CG-665-"Metal Loading Elevator", CG-667-"Space Utilization", and CG-583-"Moisture Monitor for Leaking Process Tubes".

IV. Events Influencing Costs

A. Overtime Usage

A total of 52 exempt and 370.5 nonexempt manhours was required at B Reactor during March.

B. Other

1. Non-Productive Tubes- One non-productive tube, No. 3581 a former leaker, was replaced and returned to service.

2. Gas Usage - Four new gunbarrel bellows boots were installed and a considerable number of repairs made to other boots. Gas usage during the equilibrium operating periods amounted to approximately 17,000 cubic feet per day, of which 5500 cubic feet was helium. Helium was used on 3 startups. Total helium used above the daily average for these periods was 66,000 cubic feet. As of month end, a trend indicating lower daily usage appears to be a reality.

3. Poison Column Control Facility - During the month the poison column control facility was used successfully to avoid a poison shutdown and to increase reactivity. It was estimated that the gains conservatively amounted to more than 650 units.

C PROCESSING OPERATION

I. Production

The C Reactor input production (Pu) for March was 111.5 percent of the forecast. The operating control point was tube power (average 20 hottest tubes) through March. The postponement of the CG-651 outage resulted in the higher-than-forecasted production.

II. Operating Experience

A. Operating Continuity

Fourteen unscheduled and no scheduled outages were experienced during the month as follows:

Day	Cause	Outage Hours
4	Regular Rupture - Tube 0973	33.0
6	Beckman Trip - (burned out fuse)	.3
11	Regular Rupture - Tube 3665 (2 ruptures)	38.9
15	Regular Rupture - Tube 2461	.6
15	Regular Ruptures (6 tubes)	33.5
17	Regular Rupture - Tube 3256	3.8
21	Panellit Trip - (adjusting dual Panellit gage)	31.6
23	Rupture - Tube 1080 (PT-IP-30-A)	27.0
25	Rupture - Tube 1587 (PT-IP-30-A)	.9
28	Rupture - Tube 3472 (PT-IP-30-A)	33.3
30	Regular Rupture - Tube 2466	1.6
30	Regular Rupture - Tube 2361	1.3
30	Manual Scram - Rate-of-rise limit exceeded	.2
31	Regular Ruptures - Tubes 2359 and 2464	*20.0
	Total Outage Hours	226.0

* The outage on March 31 extended into April 1.

Two of the eighteen ruptures experienced during the month were stuck, requiring removal of the tube as well as the ruptured slug.

At the time a slug ruptured in tube 0973, it was operating in accordance with PT-105-565-E. However, the piece that ruptured was a regular metal piece rather than a Ni-Al alloy M-388 slug-jacket piece.

Tubes 1080, 1587 and 3472 were operating in accordance with PT-IP-30-A at the time the ruptures occurred. All three tubes were charged with 15 pieces each of 5/8" hole-size cored E metal. A gas problem was experienced at the time two of the ruptures occurred, not only in the 105-C Building, but in the 105-B exclusion area buildings and vicinity. Readings up to 30 mrads/hr in the 105-B Control Room and 800 mrads/hr between 115-B and 105-B were experienced. Since the three tubes containing ruptured slugs had only been in the reactor approximately two weeks, and in view of the gas problem, the remaining 13 E metal tubes charged in accordance with this production test were discharged on March 29.

On two occasions during the month, March 15 and March 30, ruptures occured in localized zones. On March 15, a total of 6 ruptures was experienced in a zone bordering tube 3662. A block of approximately 105 tubes was discharged in an effort to remove any additional suspect metal. Again on March 30 and 31, four ruptures were experienced on the near side of 23 and 24 rows. A block of approximately 140 tubes was discharged in this zone in an effort to remove any additional suspect metal. The size of the two blocks of tubes was determined by selecting tubes at random, discharging and inspecting the metal.

B. Equipment Experience

Two tubes were replaced during the month as a result of stuck ruptured slugs. One tube was replaced in accordance with PT-105-634-A.

III. Improvement Experience

A. Production Tests

PT-IP-30-A - Determination of Optimum Cored Hole Size

Twenty-eight tubes were charged in accordance with this production test on March 11 (sixteen tubes of E metal slugs and twelve tubes of natural uranium slugs). Three ruptured slugs were experienced in the 5/8" hole-size cored E metal at 12, 14 and 17 days after the tubes were charged. Therefore, the remaining 13 tubes containing E metal were discharged on March 29. The 12 tubes containing natural uranium cored and solid slugs were not discharged and will be run to the exposures specified by the production test.

PT-634-A - In-Pile Cooked Slug Test

Two tubes charged in accordance with this production test were discharged in March. One tube, 1075, was removed for examination on March 11.

PT-105-565-E - Evaluation of General Corrosion Characteristics of Ni-Al alloy M-388 Slug Jackets

Tube 0973 experienced a ruptured slug after one month's operation. However, the rupture was a regular metal slug rather than a Ni-Al alloy M-388 slug. The ruptured slug was stuck and was removed by pushing tube and metal intact.

PT-IP-1-A - Evaluation of I & E Slugs Operating at High Specific Powers

One tube was discharged and six tubes charged in accordance with this production test on March 4.

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

At month's end there was a total of 217 tubes charged with I & E slugs. A total of 446 overbored nozzles has been installed to date.

A tube (1075) with .030 inches shaved from the ribs was installed to evaluate the effect on the top annulus temperature with a charge of 32 I & E slugs.

A mixing slug was charged into tube 0973 to evaluate its effectiveness in reducing the top annulus temperature in an I & E charged tube.

B. Projects

1. CG-651 "112-Tube Charge-Discharge Facility" - All sample line tubing bundles and hydraulic tubing bundles have been installed. Five front face ball valves were installed during the month, making a total of six on the reactor. Installation of electrical wiring and the vertical gamma monitoring system continued.

2. CG-656 "Raw Water Crosstie Line" - The installation was completed and accepted.

3. CG-600 "190-C Pump Replacement" - Work on installing the 66" effluent lines between the diversion box and the 107-C tanks was reactivated.

IV. Events Influencing Costs

A. Overtime

A total of 472.2 manhours overtime was required during the month.

B. Other

The extensive number of outages for ruptures increased costs.

B-C POWER OPERATION

I. Operating Experience

The river elevation varied between 385.2 and 387.5 feet while turbidity ranged between 24 and 1620 p.p.m. during the month. Water treatment was difficult during the period from March 1 to March 10. The coagulant supply was taxed by the abnormal feeds required during the periods of high turbidity.

The export pressure dropped from 201 pounds to 34 pounds at 1:00 p.m. on March 26. The low pressure was caused by cycling in the H Area Surge Suppressor.

II. Equipment Experience

183-C Building - No. 2 B monorake cable fell into the flocculator pit causing the cable to entwine around one paddle breaking the paddle and cable on March 19. The cable has been replaced and work was in progress on the paddle at month's end.

181-B Building - The No. 12 B river pump required replacement of 13 broken stud bolts. The unit still vibrates excessively but correction was delayed by labor trouble in Construction Operation. Other CG-558 units installed by Construction Operation were inspected on March 25 and found to be satisfactory.

183-B Building - The No. 6 DeLaval low head pump in the Pump Room was inspected for cavitation damage on March 22. Severe damage was found in the suction vanes. The erosion cavities were filled with an epoxy resin "EPON 828" and returned to service March 29.

190-B Annex - No. 3 process pump unit was opened for inspection on March 9. Extensive cavitation damage was discovered in the suction vanes of the primary impeller. The remaining pumps were inspected and found in a similar condition. Five replacement impeller assemblies were obtained from 100-H and one from 100-F Areas. These assemblies were installed in Numbers 1, 3, 5, 6, 7 and 8 units. No. 2 assembly was installed as removed and will be allowed to cavitate to destruction. No. 4 assembly erosion cavities were filled with an epoxy resin "Aluminum Metalset A-2".

III. Improvement Experience

A. Projects

CG-600 "100-C Area Installation" - Construction Operation removed the single stage pump from No. 12 unit on March 4 and installed a new pump on March 8. A test of this unit was completed but the results have not been received from Engineering Operation.

IV. Events Influencing Costs

1. Water treatment costs were higher due to increased feed during periods of high turbidity.

2. Maintenance costs were higher due to the purchase and unloading of 100 tons of sand into the 183-B filters and the replacement of a cable to No. 2 B monorake at 183-C.

3. The total overtime worked by B/C Power Operation employees for the month of March was 91.4 manhours.

B-C RADIATION MONITORING OPERATION

I. Radiation Occurrences

There were no radiation incidents requiring formal investigations and reporting.

A processing Operator received an uncontrolled exposure while working in the 3X ball room at 105-C. Later determinations indicated a personnel dose rate as high as 10 r/hr. Employees total exposure for the job was 110 mr. This incident was investigated informally and will be reported separately.

Radioactive gas from a ruptured slug at 105-C spread from the 107-C effluent line vent to the 115-B and 105-B buildings on two occasions. This gave rise to personnel dose rates in the 115-B building to 50 mrads/hr, 30 mrads/hr in the corridors, offices and control room of 105-B and up to 800 mrads/hr in the outside area between the 105-B and 115-B buildings. Due to activity levels present in area, contamination surveys of personnel were made with a C.P. meter. The clothing of two employees indicated up to 15 mrads/hr at 2". All individuals and clothing involved were effectively decontaminated.

II. External Exposure Control

Discharge of ruptured fuel elements, by the "quickie" method, at 105-C occasioned personnel dose rates up to 5 r/hr. Radiation level measurements up to 200 r/hr were made in locating the ruptures.

Recovery of the 3X balls at 105-B was done with maximum personnel dose rates of 400 mrads/hr. The hoppers were refilled with reclaimed balls from 105-C, with personnel dose rates up to 800 mrads/hr. Radiation levels up to 3.5 r/hr are present at the sides of the hoppers.

Personnel dose rates on top of the 105-C reactor, inside the VSR enclosure, have increased by a factor of ten. This is caused by contamination levels up to 12 rads/hr on top of the hoppers.

III. Contamination Experience

Contamination spread to the rear wall of the 105-C discharge area encompasses an area of about ten square feet. Activity measurements of 20 rads/hr including 1 r/hr gamma at 4" were made.

Reactor atmosphere gas remains as a problem at both 105-B and 105-C with activity levels up to 8 rads/hr measured.

There were eleven instances of clothing contamination, up to 15 mrads/hr. All, except one, were released.

Of the ten recorded cases of skin contamination, up to 40,000 c/m, all were readily decontaminated and presented no exposure problem.

There were 55 vehicles surveyed, with one found to be contaminated to a level of 3,000 c/m. It was decontaminated.

Of the 221 air samples taken, none indicated activity densities above permissible limits for respiratory protection worn.

IV. Events Influencing Costs

783 hours of overtime was used.

B-C MAINTENANCE OPERATION

I. Equipment Experience

A. Instruments

1. Temperature Monitor - Ten faulty thermocouples at B Reactor and nineteen at C Reactor were replaced.

2. Pressure Monitor - Eight panellit gauges were replaced at B Reactor: three due to leaks, one a possible plug, two due to a faulty arm, and two suspected as faulty. Five defective gauges were replaced at C Reactor; two had broken sector cock nuts, one leaked at the elbow fitting, one was sluggish, and one had excessive play in the dial bearings.

B. Electrical

1. Ball 3X Drop 105-B - The cause of the 3X ball drop was traced to failure of the single common return wire on the hopper solenoid circuits. The failure occurred as a result of a loose connection at the No. 4 terminal block. Corrective action taken consisted of: Replacing the single Number 14 common conductor with five parallel Number 14 wires; Rewiring the main control panel with switchboard wire of proper size; Steps 1 and 2 reduced the voltage drop in the system, permitting removal of four end cells from each battery (1, 2, 3, & 4 were removed) - solenoid coils are now tapped across cells 51 through 60; The tinned end of the conductors were removed and bare copper inserted into the terminals to provide a more secure connection.

C. Mechanical

1. Tube Removal - During the Ball 3-X outage at B Reactor, 68 tubes were scheduled for replacement. Only sixty-seven were replaced; one channel, Number 1578, was not retubed after probing indicated an obstruction left in the channel. Average time per tube was 1.09 hours. Interference with tube removal work was experienced from ball recovery work in progress and welding on the crossover line between the near riser and downcomer.

2. Tool Dolly Gate - The C Reactor sliding tool dolly gate was replaced with a swinging gate. The sliding gate had required excessive maintenance and was considered a safety hazard. The new gate can be pushed open by the tool dolly if necessary.

3. I & E Nozzles - An additional 100 "B" type nozzles were salvaged from Post-CG-558. These were machined to permit installation in the fringe area of "C" pile thus releasing an additional 100 "C" type nozzles for boring to accept I & E slugs.

4. Pump Units - 190-B Annex - In addition to the impeller replacements (reported by the Power Operation), the following work was performed: Clearances were adjusted on the Kingsbury thrust bearings on all units; Spacer rings were installed in the couplings between the flywheel and speed increaser on No. 3 and 7 units; Piping was installed to check suction, interstage, and discharge pressure on all units. Temporary Heise gages were installed on No. 2 unit; the slip rings on all motors were stoned to resurface badly scratched surfaces; Commutators on all the exciters were hand stoned to remove nicks and high mica; Brushes were replaced, realigned, and proper pressure applied on all slip rings and commutators.

II. Shift Maintenance Activities

Reactor tube work at B, H and D Reactors, and a water leak at F Reactor, consumed the major portion of available shift manpower during the month. Project CG-558 connected work at D Reactor also required shift manpower. The major portion of the work done during the 3X ball removal at 105-B was performed by shift personnel.

III. Maintenance Engineering and Planning and Scheduling

A. Instrument Engineering

Panellit Gauges Oscillation - Efforts to develop a satisfactory device to suppress excessive Panellit gauge oscillation continued during the month. Additional capillary type devices were tested with more success than previous devices, but their performance was still not satisfactory. Discussions were held with a representative of the Westinghouse Air Brake Company regarding their device known as a "desurger". Plan were made to purchase several of these devices for test.

B. Mechanical Engineering

Dummy Decontamination Stations - A study of the decontamination facility requirements at B and C Reactors was completed. Designs prepared by Plant Engineering were approved and issued for an acid storage and supply arrangement to eliminate the safety hazard presented by manual handling of acid at both reactors. Also, designs were prepared and issued for a more efficient decontamination facility of increased capacity and safety at B Reactor.

C. Electrical Engineering

Design Change Number 161-B - Ball 3X System - As a result of the recent ball drop at B Reactor, Design Change Number 161-B was prepared and issued to provide rewiring instructions to correct a portion of the system wiring. The major changes included installation of a larger common wire throughout the system and rewiring of the main control panel. An as-built wiring diagram of the main control panel and an as-built system elementary wiring diagram were prepared to facilitate future trouble shooting.

D. Planning and Scheduling

1. Productive Maintenance - A total of 6120 manhours of productive maintenance work was scheduled during March. This consisted of 134 Class A overhauls, 325 Class B overhauls or inspections, 4 Class C, 17 inspections and 10 lubrications. Of this total, 62.2 percent was completed. Lack of sufficient manpower was the greatest influencing factor of the Productive Maintenance program in March. This was due to unavailability of shift personnel and the large volume of emergency work occurring during the month.

IV. Events Influencing Costs

A. Overtime Usage

A large amount of overtime was required this month to man the emergency work. Overtime for B-C Maintenance Operation was 2570.8 hours; of this amount 1070.1 hours were for B-C Operation work excluding the 190-B Annex pumps; the balance of the hours were for other areas and project work.

B. Labor Costs

Higher labor costs were incurred due to the ball drop and tube removal work at 105-B, replacement of impellers in the 190-B Annex, and the number of ruptures at 105-C.

A. R. Maguire

Manager
B-C REACTOR OPERATION

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D-DR REACTOR OPERATION
MARCH, 1957

I. Responsibility

Responsibilities assumed by the Project Engineering Operation during Project CG-558 at D Reactor were relinquished on March 22. Other assigned responsibilities of the D-DR Reactor Operation remained unchanged during the month.

II. Organization

E. Koleber, Supervisor II, was transferred to D Processing Operation, from KE-KW Reactor Operation.

W. C. Seidle, Supervisor II, was transferred to D Processing Operation, from F Reactor Operation.

III. Force Report

	February 28			March 31			Net Change
	NE	E	Total	NE	E	Total	of Total
D-DR General	1	1	2	1	1	2	0
D-DR Admin. & Pers. Dev.	2	3	5	2	3	5	0
D Processing	36	7	43	36	9	45	+2
DR Processing	30	8	38	30	8	38	0
D-DR Power	111	14	125	111	14	125	0
D-DR Rad. Mon.	18	5	23	21	5	26	+3
D-DR Maintenance	133	21	154	134	21	155	+1
Totals	331	59	390	335	61	396	+6

IV. Safety and Security Experience

There were 21 medical treatment cases and no disabling injuries during March. Assigned personnel incurred no security violations during the month.

V. Personnel Activities

Two Technical Graduates are still on assignment with the D-DR Reactor Operation.

C. M. Salina attended the Tenth Western Metal Exposition and Congress in Los Angeles and consulted with Beckman Instrument Company personnel.

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.

ADMINISTRATION AND PERSONNEL DEVELOPMENT OPERATION

I. Administrative and Personnel Development Activities

The Employee Relations Operation was supplied with a list of policies or practices needing standardization at either the HAPO or Department level.

I. Administration and Personnel Development Activities (Continued)

The more pertinent items include: overtime transportation, plant lighting standards, overtime policy, Power House evacuation, secretarial and clerical promotion policy, etc.

Eight of our exempt employees have been scheduled to attend an Industrial Psychology course consisting of six two-hour sessions. Dr. J. C. Conant, Industrial Physician, will moderate the sessions aimed at providing supervisors with a more thorough understanding of work motivations, etc.

Four D-DR Reactor Operation employees participated in the four-day Work Simplification Program completed on March 6. They were R. J. Ascherl, O. L. Olson, C. M. Salina, and A. R. Sutton.

II. Cost Control Activities

Budgeted overtime for the third quarter of FY-1957 was 6,675 hours - actual overtime worked in support of D-DR Reactor Operation was 9,541 hours, or 4.66 percent of the available manhours. The higher than anticipated overtime resulted from performing high burnout work at both reactors during Project CG-558 outages.

Assistance was given to Financial Operation in preparing the revised operating budget for FY-1958. Budgeted product costs for FY-1958 total $9,833,389 compared to budgeted costs of $9,148,000 for FY-1957.

III. Landlord Activities

Approximately eight painters began work on the interior painting backlog on March 25. They will remain in the Area until weather permits their moving to exterior painting.

Telephone requirements for 100-D Area were reviewed and a recommendation made to L. S. Howard, Superintendent, Plant Telephone and Radio, that a 101 pair cable be provided for the Area rather than a 51 pair cable as scheduled.

D PROCESSING OPERATION

I. Production

D Reactor was shut down throughout March for Project CG-558 work.

II. Operating Experience

A. Equipment Experience

New individual outlet water temperature thermocouples were installed in the rear of each tube. A connector panel was installed in the duct on the top-rear of the reactor. The old thermocouple lead wires were utilized from the control room to the new connector panel. New lead wires were strung from the panel to the new thermocouples.

A. Equipment Experience (Continued)

Five problem tube channels; 3282-D, 3682-D, 0862-D, 1273-D and 4688-D, were cleared with little difficulty by pulling loose tube sections out the front and re-splitting the remaining tube sections. The channels were subsequently retubed. Problem channels 2274-D and 3457-D were cleared by drilling out the remaining tubing - they too were retubed. Channels 1076-D, 3373-D and 2368-D could not be cleared in the available time. Three empty channels from last month's tube replacement outage, were retubed. At month end, there were only four inactive channels in the D Reactor.

A new graphite stringer containing thermocouples was installed in channel 3484-D. The obstruction in VSR channel 24 was cleared and the VSR returned to service.

New sheaves and cables were installed on C Elevator and minor repairs made to both the C and D Elevators.

During electrical fault tests conducted in March, the emergency alternator attempted to start but the magneto relay stuck and caused flooding of the carburetor and running down of the battery. The damage was repaired and the alternator now operates satisfactorily.

All of the rear face fringe galvanized nozzles were replaced with standard aluminum nozzles. Clip-on tube numbering tags were installed on a majority of the nozzles in the upper half of the reactor. These tags snap over the nozzle behind the cap and have numbers which are baked on.

III. Improvement Experience

A. Production and Process Tests

A new sub-critical monitoring assembly containing movable fission chambers was installed on "X" level. A realistic comparison of the new sensitivity of the present "B" hole sub-critical monitor and the sub-critical assembly is now possible.

B. Projects

Project CG-558 work which began on February 18, was completed on March 22. Pertinent accomplishments (details of which are available in the Project Engineering Operation Record Report) were:

1. New front face nozzles were reamed 20 mils eccentrically toward the top to accommodate I and E slugs which should become available at a later date.

2. Hamlin DT-100 mercury switches were installed in all Panellit gauges. The Hamlin switch was found superior to the Flexor switch used at B and DR Reactors.

B. Projects (Continued)

3. The rear face phase of Project CG-684, "Adequate Fresh Air Facilities - 105-D," was completed.

4. Re-orificing, originally scheduled for three zones, was completed in two zones. The third, or outer fringe zone, was eliminated to preclude cavitation and critical flow difficulties encountered at B Reactor. Primary and secondary orifice inserts were tack-welded at the instigation of D Processing Operation to eliminate the possibility of reversing the orifices during subsequent reinstallation.

C. Other

A 24-tube Poison Column Control Facility (PCCF) was installed during the extended outage. Four of the PCCF tubes were loaded with regular metal, and the remaining 20 with temporary poison.

Zone temperature monitor elements were installed on 211 rear pigtails. The monitor system, when completed, will provide continuous monitoring of 10 tubes in each of 21 control zones. Temperature sensitive trips will permit immediate identification of the hottest tubes through a system of coordinate lights located at the console.

IV. Events Influencing Costs

Significant increases in production and decreases in unit cost are anticipated as a result of Project CG-558 work.

Project CG-558 modifications necessitated the testing of water flow continuity through process tubes and pigtails. A revised method for performing these tests was used at DR Reactor in February and was reported in our February Record Report. Testing procedure consumed 20 hours of shutdown time. In March the method was further refined by A. N. Stinson and A. K. Hardin for use at D Reactor. As a result, flow continuity checks were performed in only 10 hours at D Reactor.

DR PROCESSING OPERATION

I. Production

Input production was 93.2 percent of official forecast for March and time operated efficiency was 78 percent. The forecast production was not attained chiefly because of five unscheduled outages.

The maximum level attained during the month was 10 units above the previous high. Production for a 24-hour period was 29 units above the previous high.

II. Operating Experience

A. Operating Continuity

Operating continuity was as follows:

A. Operating Continuity (Continued)

Date of Outage	Outage Hours	Cause
3/1/57	35.4	PCC charger became disconnected from the front ball valve during poison charging.
3/5/57	29.0	Rupture in tube 2485-DR. Quickie removal was successful: failed to make recovery because hose reel on HSR 2 failed.
3/7/57	0.5	Panellit scram from an oscillating gauge.
3/10/57	0.6	Power failure trip due to an undervoltage condition caused by a ground on the 230 KV line at 100-K Area.
3/10/57 3/20/57	27.7 68.9	Panellit Trip - Flushing Poison Outage to complete ATP - 2013, "Dual Area Trip Out Tests", and PTP-A003 fault tests. Other work included regular charge-discharge and probologing.
3/24/57	0.5	Panellit trip caused by operation of the incorrect toggle valve during a Heise check.

Another unsuccessful attempt was made to remove the stuck graphite thermocouple stringer from channel 2472-DR. All thermocouples on the stringers installed during the Project CG-558 shutdown are in operating condition.

The broken vent sections reported in last month's report were removed from the far downcomer and the sample lines plugged. When water was again turned into the downcomer, no leak was apparent.

During March, the building settlement became apparent in the monitor room and lunch room areas. The following steps have been taken by Facilities Engineering personnel to analyze the problem:

1. A monthly survey of the building to detect and measure settlement is to be made.

2. Holes were drilled in the near and far gas tunnel floors. There appears to be a two-inch void under these floors.

3. Arrangements are in progress to drill two test holes outside of the building to check for water which might be causing the settlement.

A. Operating Continuity (Continued)

X-rays of the tip section of No. 10 VSR show that the masonite, aluminum and polyethylene in this section have been damaged by heat.

On March 1, a minimum outage resulted when the PCC charging machine slipped off a tube while charging of poison was in progress. It was found that the threads on the coupling had bent and prevented a secure hook-up to this tube. The threads were relieved and the equipment retested satisfactorily on all ball valve tubes.

After the reactor was shut down on March 5 for the quickie discharge of a rupture, No. 2 HCR hose reel failed to retract the hose during start-up proceedings. The hose became tangled in the rod machinery making the rod inoperable. All of the rod reels had been serviced during the Project CG-558 outage. Evidently the packing was too tight on this rod. Although all reels were again checked for proper operation and No. 2 Rod repacked, the reel failed again during the start-up on March 24.

III. Improvement Experience

A. Production and Process Tests

The top biological shield temperatures observed since the Project CG-558 start-up have reached 195° C. This is considerably above the expected temperatures of 100 C. Subsequently, 20 tubes in the top row of the reactor were charged with Mint and compensating enrichment was charged into 20 tubes two lattice units below - per PT-IP-14-AC, "Use of E Metal in Shield Protection". Shield temperatures have since been much lower, but so have tube temperatures indicating that an insufficient amount of compensating enrichment was charged.

Eight tubes of weighed and measured material were charged under auspices of PT-IP-56-A - "Evaluation of Low Hydrogen Dingot Material".

Three short-term exposure samples were processed in the PCCF as authorized by PT-105-15-D, "Irradiation Service Request HAPO 184. Four HAPO-155 samples and 1 HAPO 202 sample were likewise exposed as authorized by DT-105-536-SI, "Supplement B Studies of the Diffusion of Rare Gases in Uranium, Irradiation Service Request No. HAPO-166".

B. Projects

Work on Project CG-583 - "Moisture Monitoring for Detection of Tube Leaks" was completed in March and the equipment put in use.

The reactor was shut down on March 20 to perform tests ATP-2013 and PTP-A003. Because of problems associated with pump conditions, necessary modifications to the water plant and reactor were made during the outage to permit six pump operation at the water plant. Reactor power level has not suffered to date by the resultant lower flow. A test was run to evaluate the problems associated with addition of air at the 190 pump inlets as a means of reducing cavitation. Results of the test indicate that this solution is not practical since one of the pumps lost prime during the test causing a serious drop in flow to the reactor.

B. Projects (Continued)

The metal loading elevator base, Project CG-665 - "Metal Loading Facilities," was installed in the work area during the month.

IV. Events Influencing Costs

Because of the low operating efficiency during March, unit cost is expected to be higher than normal. Total costs are expected to be above normal due to the greater than normal amount of maintenance work accomplished, plus billing for maintenance work accomplished in January and February.

D-DR POWER OPERATION

I. Operating Experience

Critical power conditions, Grade "S" were experienced in 100-D Area and Grade "W" in 'DR' Area on March 6 and 19, respectively. Critical power condition, Grade "S" was experienced in both areas on March 21.

An all time high raw water turbidity of 1,230 ppm was experienced at each water plant on March 2. Process water quality was maintained at each plant by increasing chemical feeds and reducing filter runs.

The export pumping load was supplied by 100-B Area during the month. The export line between 100-D Area and Building 901 was removed from service on March 11 to replace a broken simplex vent valve and to remove a 6-inch bypass valve that had cracked. The line was placed back in service on March 12. A water pressure surge occurred on the export system on March 26, when the surge suppressors cycled open in 100-H Area.

A power surge on the No. 3 transmission line from 100-K Area to the Midway Substation on March 10 caused the No. 4 190-DR process water pump motor to drop out of synchronization. As a result, the Loss of Power Relay opened and DR Reactor was scrammed.

Boiler operation was satisfactory during the month. The average steam load was 116,000 lbs/hr, maximum load was 397,000 lbs/hr. The average evaporation rate was 7.4 with an average efficiency of 72.0.

Process water system flow and trip-out test at 100-D and 100-DR Areas, ATP-2013, was completed on March 20.

Stability Fault tests on the 13.8 KV system, 100-D and 100-DR Areas were completed on March 21.

II. Equipment Experience

The south half of the 182-D reservoir was removed from service and drained on March 5 for cleaning. The reservoir was refilled and returned to normal service on March 10.

II. Equipment Experience (Continued)

No. 3 Process Pump in Building 183-D was dismantled on March 22 to inspect the impeller - some cavitation erosion was evidenced. In addition, the shaft packing gland sleeves were found to be damaged to the extent that metalizing is required on each sleeve.

Repairs to the emergency generator at Building 184-D were completed on March 8. The generator was returned to automatic emergency stand-by service on the same date.

Puget Sound Painting Company completed its contract for removing insulation from, and the painting of, the Nos. 2 and 3 Process Storage Tanks in Building 190-D.

The Nos. 1, 4 and 5 process water pumps in Building 190-DR were dismantled on March 18, 20 and 25 respectively to inspect the impellers for cavitation. Considerable cavitation was noted on each of the first stage impellers. A test to determine the effect of air in the suction header of the new annex pumps was conducted on March 22. The test was suspended when the suction head broke causing erratic water flow.

III. Improvement Experience

Project CG-616, "Acid Addition Facilities at 183-D and DR Water Plants", was completed.

All Project CG-558 construction work has been completed in 100-D Area on March 16 except for punch list items.

Minor Construction Forces dismantled 190-D Annex Pumps Nos. 1, 2, 3 and 4 to facilitate impeller and wearing ring modifications necessitated by excessive cavitation.

IV. Events Influencing Costs

Significant items affecting Power Operation costs included:

a. Increased chemical feed rates.
b. Increased maintenance of facilities and equipment as permitted by the Project CG-558 outage.
c. Increased overtime requirements.
d. Repairs on the 184 Emergency Generator and S.K. Valve.

D-DR RADIATION MONITORING OPERATION

I. Radiation Occurrences

A total of five lapses of radiation control occurred during March.

a. At DR Reactor, while charging poison during operation, the charging machine broke loose from the ball valve. Four men were contaminated up to 2000 c/m when water backflushed from the tube.

[redacted]

I. Radiation Occurrences (Continued)

b. Personnel were surveyed leaving the DR Reactor downcomer room following inspection - 20,000 c/m was found on the sole of an employee's shoe.
c. An employee entered the DR Reactor central viewer room to observe poison discharge operations without adequate monitoring service.
d. A maintenance employee entered and worked in the D Reactor discharge area without wearing his personnel meters.
e. Two employees stepped into contaminated water from a leaking sink drain at Building 189-D. Their personal shoes were contaminated to 10,000 c/m and could not be cleaned.

II. External Exposure

Dose rates to personnel for performing discharge area work during the Project CG-558 outage at Building 105-D, following decontamination, were as follows:

Top 1/3 of rear face	-	10 to 30 mr/hr
Middle 1/3 of rear face	-	30 to 80 mr/hr
Bottom 1/3 of rear face	-	80 to 100 mr/hr

Safety planks and other debris were removed from the D Reactor discharge area supply air tunnel at maximum dose rates of 1 r/hr.

Maintenance employees received a maximum dose rate of 4 r/hr while working on a problem tube in the DR Reactor discharge area. A Processing Operation employee received a 3 r/hr dose rate while removing quickie discharge equipment in the same location.

On two occasions, Instrument personnel received dose rates up to 1.5 rad/hr while installing and connecting a chamber in an experimental hole at the DR Reactor X-1 level.

A DR Processing employee received a momentary exposure dose rate of 5 r/hr while removing two inserts and a bucket from a "J" cask.

Dose rates up to 150 mr/hr were received when tube sections were removed from the 105-D charge face. Contamination spread from this operation was kept to a minimum.

III. Contamination Experience

Air samples collected did not exceed the MPL for the respiratory protection worn and the isotopes involved.

High background levels due to effluent vapor leaking from the No. 1, D Reactor junction box and the D-DR effluent tie-in box were experienced several times during the month due to open step-plugs. At times background levels inside Building 105-D were as high as 3000 c/m. When the step-plugs were replaced this condition returned to normal.

The No. 6 sedimentation basin at Building 183-DR was drained and 2000 to 6000 c/m was found on the sludge.

IV. Events Influencing Costs

Project CG-558 work was in progress at D Reactor during the entire month, resulting in four times the usual applied labor cost for monitoring at that location. In addition, approximately 200 hours on nonexempt overtime was worked during the tube replacement outage at D Reactor.

D-DR MAINTENANCE OPERATION

I. Equipment Experience

A. Instruments

1. Panellit Data

	105-D	105-DR
Base Checks	2	1
Gauges Adjusted During Operation	0	1600
Gauges Replaced		
Mercury Separation	0	2
Defective Switches	0	11
Capillary Tube Failure	0	0
Other	All for CG-558	4 - for Stripped gears
Impulse Lines		
Response Checks	0	0
Sluggish Lines Corrected	0	0
Oil Added	0	Fringe Zone

The installation of modified Panellit gauges and new toggle valves at the D Reactor was completed during the Project CG-558 outage.

2. Temperature Monitor System

New thermocouples and near face leads were installed for all tubes by Project Maintenance during the Project CG-558 outage at D Reactor.

3. Pile Control Instrumentation

A spare graphite thermocouple stringer was installed in channel 3484-D. No trouble was experienced in removing the old stringer from this location.

B. Electrical

All VSR's and HCR's at D Reactor were inspected and repaired. Time delay checks and reliability checks were made on all critical relays and three safety circuits. The Ball 3X time delay relays were set for 5.2 seconds each. Design change No. 163 was completed on the Ball 3X system. The purpose of this change was to separate the common ground wire between twin circuits. New cables were pulled in from the four control Beckmans to the -9' level on the near side. Particular attention was given to keeping these cables away from other cables carrying high circuits to reduce erratic Beckman operation.

B. Electrical (Continued)

The D Reactor emergency generator failed during the power outage fault testing. The sticking relays were repaired and the unit returned to service on March 25.

Trips on the under-voltage relays for the 190-D 4,500 hp motors were reduced from 85 volts to 70 volts. Collector rings on the No. 1 motor were found to be wearing a groove on the motor. During fault tests, one of the interpole coils on No. 5 exciter opened. With no exciter circuit, it is impossible to synchronize the motor. A replacement was procured from 100-H Area by Construction Engineering. During these same fault tests, several of the motors reverted to induction so it is to be assumed that with the present equipment, the power loss panel will scram the reactor when a major fault occurs.

C. Mechanical

Ten problem tubes were removed by shift crews following the Project CG-558 outage. One of the sheave wheels on the "C" Elevator was cracked prior to the Project CG-558 outage. New sheaves and new cables were installed during the outage.

The top half of pumps Nos. 1, 4 and 5 at Building 190-DR were removed for cavitation inspection by the Design Engineers. During the month of March no repair was attempted on these units.

The wire on the fence from the Main Badge House to the DR outfall line has become loose because of the pressure exerted by weeds. Eighty wooden posts were replaced in the fence during the month.

Material Handling included:

Sand	- 1000 bags	Dichromate	- 120 drums
Oil	- 8 drums	Casks	- 8
Alum	- 1680 bags	Alum dumped	- 1350 bags
Super Cell	- 100 bags		

II. Maintenance Shift Activities

The shift crews spent 95 percent of their time in 100-D Area in connection with maintenance work being performed during the Project CG-558 outage.

III. Maintenance Engineering and Planning and Scheduling

A. Instrument and Electrical Engineering

Some difficulty has been experienced in maintaining the diaphragm motors in the filter flow control systems in Building 183-D. With post Project CG-558 flows, the maximum differential pressure applied to these diaphragms is approximately three and one-half times greater than the original design pressure. A study indicates that if the pressure to these motors were reduced by one-half, the maintenance would be reduced to a nominal amount and the motors would still have enough power to do the required work. Tests have been made to establish a

A. Instrument and Electrical Engineering (Continued)

differential pressure curve for the existing venturi tubes on this system. Reduced differential pressure can be obtained by moving the low pressure tap on this venturi to a point about six inches up stream from the present location.

Based on the results of these tests, a proposal for a prototype filter control has been written. Installation and tests on this prototype would be made preferably after the individual flow meters for the filters are installed.

Installation of new gas make-up equipment in Building 115-D is complete. The equipment, installed during the Project CG-558 outage for D Reactor, permits better control and accountability of all gas used. Grouping of make-up and purge control instruments for centralized operation was achieved during this installation.

A survey of the operating condition and adequacy of the control valves, gas meters, and flow rate recorders for DR Reactor gas system has been completed. A report on the finding of this survey will be issued next month.

Assistance was rendered during the installation and testing of circuitry for Design Change 163 - "Ball 3X Safety Circuit." This design change provides separate grounds for the twin circuits employed in the Ball 3X System.

B. Mechanical Engineering

To facilitate operation of the new cross-header valves installed on D and DR Reactors, portable power units are being procured. These units can be adapted to operate any valve with minor modifications.

A revised system of supplying high pressure water to the "C" Elevator is being designed to eliminate the overhead cross-header and the need to disconnect and connect to the two-inch high pressure riser depending on the elevator position. The new system will be located under the elevator floor grating and will be accessible through a removable section of the floor. A trail hose will connect the new header to the two-inch riser.

C. Planning and Scheduling

The inventory and reconciling of records with Plant Accounting, Financial Operation, of uninstalled equipment in the 100-D & DR Maintenance Operation was completed. A usage survey was made of all heavy transportation equipment and the appropriate forms completed. The budget for spare parts, to be used in the 100-D & DR Maintenance Operation for FY-1958, was completed.

The actual scheduling of Productive Maintenance work was begun during March for all crafts except Instruments. Approximately 12 percent of the scheduling is completed.

E. W. O'Rorke
Manager,
D & DR REACTOR OPERATION

EW O'Rorke:af

DECLASSIFIED

F REACTOR OPERATION
MARCH - 1957

GENERAL

I. Responsibility

There were no changes in assigned responsibility for F Reactor Operation.

II. Organization

W. C. Seidle, Supervisor - Radiation Monitoring, transferred to D Processing Operation as Supervisor II, effective March 1.

III. Force Report

	February 28			March 31			Net Change
	NE	E	Total	NE	E	Total	of Total
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:	68	8	76	67	8	75	-1
Radiation Monitoring Operation:	10	4	14	11	3	14	0
Maintenance Operation:	92	16	108	92	16	108	0
Total:	207	40	247	207	39	246	-1

IV. Safety and Security Experience

There were no disabling injuries and no security violations incurred.

Nine medical treatment cases were reported for the month of March.

V. Personnel Activities

Twenty-five F Reactor personnel participated in conference table meetings conducted by C. N. Gross.

R. L. Richardson, Electrical Engineer, presented a talk on "The Mathematical Analysis of Circuit Reliability" to the Richland section of the A.I.E.E.

Fifteen nonexempt and one exempt personnel attended CG-558 training programs on electrical fundamentals conducted by V. R. Griffith.

S. L. Nelson attended the 1957 Nuclear Congress in Philadelphia from March 11-15. On the same trip, he contacted Brooks Rotometer Company regarding replacement of gamma monitor rotometers.

V. Personnel Activities (Continued)

S. F. Ginther and V. L. Rooney completed the Work Simplification Course.

VI. Nonroutine Reports Issued

None.

VII. 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..

F ADMINISTRATION AND PERSONNEL DEVELOPMENT

I. Administrative Activities

Eight IPD advices were reviewed for context and returned to the issuer with comments.

II. Personnel Development

Schedules were arranged for the second series of information meetings for F Reactor exempt personnel, with meetings to start on April 15.

III. Cost Control Activities

The Savings and Improvement report for the period July 1, 1956, to March 31, 1957, was submitted to Financial Operation.

IV. Landlord Activities

Maintenance Operation completed an engineering study of building ventilation and cooling facilities. Work was initiated in line with recommendations.

A survey of building janitorial services was completed in conjunction with Industrial Engineering and F Maintenance personnel. A routine work schedule for janitorial services was submitted for 100-F Area buildings.

A survey of building floors was completed and a list of floors to be refinished and color-sealed was submitted to the floor maintenance supervisor.

F PROCESSING OPERATION

I. Production

Reactor input production was 98.7 per cent of forecast for March. The forecasts were not achieved because of an advance in the CG-558 outage schedule, a ruptured slug outage, and a leak testing outage.

I. Production (Continued)

Power levels were limited during March by a 102 C delta water temperature limit on reactor process tubes.

II. Operating Experience

A. Operating Continuity

Outage Date	Outage Hours	Reason
3/17/57	44.7	Location and repair of Van Stone leak on Tube 3560.
3/21/57	25.9	Removal of ruptured slug from Tube 1964.
3/26/57	139.0	Scheduled outage for CG-558 modifications. Charge-discharge, leak testing, and tube replacement were accomplished during the March portion of the outage. The reactor remained down over month end.
	209.6	

One ruptured slug was experienced during the month. The charge was successfully removed with the quickie equipment, but immediate recovery from the brief outage was unsuccessful because of insufficient reactivity. Data on the rupture are as follows:

Tube: 1964
Concentration: 303
Type of Rupture: Side Failure
Charge Date: 1/4/57
Lot Number: Z-245

Date of Rupture: March 21, 1957
Outage Hours Charged to Rupture: 25.2
Approximate Tube Power at Time of Failure: 691 kw

High radiation levels existed on the rear face of the reactor for several hours after each shutdown during the month. On March 17, these high levels resulted in a loss of 3.5 hours of outage time. The exact source of the radiation was not determined but was believed to be inside the rear face piping. The half life of the major radiation source appeared to be about two and one-half hours.

B. Equipment Experience

Tube Replacement - Removal and replacement of 80 F Reactor process tubes was completed during March.

Gas System - Seamless boots were installed on two rear gunbarrels.

Leak Testing - The reactor was leak tested with the helium detector on two occasions during March. On March 17, a leaking rear Van Stone was found on Tube 3560. A new Van Stone was rolled and the tube was restored to service. On March 27, testing with the helium leak detector revealed no leaks on regular process tubes, although leaks were found on four tubes with O-ring seals (see Improvements below).

III. Improvement Experience

A. Production Test 105-524-SI - "Irradiation Service Request No. HAPO-105 In-Pile Measurement of Reaction Between Pile Gas Impurities and Proposed Process Tube and Slug Jacket Materials" - During the outage of March 21, the special samples were removed from Tube 3474 (the samples were removed from 3469 on a previous outage), and the inner tubes were removed from channels 3474 and 3469. This concluded the production test and the tubes were restored to service.

Process Test MR-105-31 - "Process Tube Sliding Seal" - On the outage of March 26, an indication of a leak on Row 25 was obtained with the helium detector. Tubes 2676, 2677, 2678, and 2680 had been equipped with O-ring seals under this process test on January 6, 1956. These tubes would not hold pressure and leaks were found at the O-rings. It is possible that no water leaked into the graphite from these tubes because weep holes are provided between the O-rings.

Production Test 105-471-P - "ANL-135 - Special Request" - The samples charged into Tube 3364 on June 8, 1953, were discharged on March 26, 1957. The samples consisted of dummies with Zr-U^{235} strips attached.

Production Test 105-540-SI - "Irradiation Service Request HAPO-167 - Production of Cobalt for Gamma Facilities" - The cobalt samples charged into Tube 1568 on January 4, 1957, were discharged on March 26.

B. Projects

CG-558 - Construction Operation performed work on water plant and effluent line modifications during the month. For details, see Facilities Engineering Operation Monthly Record Report.

C. Other Improvements

On March 18, the Ball 3X System wiring was modified to eliminate overloads on conductors for the solenoid power supply.

IV. Events Influencing Costs

155.9 man-hours of nonexempt overtime were used by the F Processing Operation.

F POWER OPERATION

I. Operating Experience

One of the three operating boilers was out of service from 2:40 a.m. to 2:55 a.m. on March 11, due to a rock lodging in a coal feeder. Normal steam pressure was maintained during the period by the other two boilers.

Raw water turbidity reached a maximum of 1072 ppm on March 2. The maximum chemical treatment required was 52 ppm alum and 0.033 ppm Separan.

I. Operating Experience (Continued)

No. 3 export pump in 182 Building was placed in service on March 11, from 10:40 a.m. to 12:05 p.m. to assist in maintaining service and pressure on the export water system.

During tests on No. 7 process pump in 190 Building annex on March 17 and March 21, the No. 4 process water storage tank and process pump suction header were isolated so that higher pressure could be supplied to the pump suction.

II. Equipment Experience

The west half of clearwell and raw water basins in 183 Building were drained for inspection and repairs on March 27.

The 10-million-gallon reservoir in 182 Building was drained on March 28, for inspection, cleaning, and repairs.

No. 1 boiler in 184 Building was made available for service after completion of a Class "A" Productive Maintenance inspection and repair on March 27.

The west process water high tank was drained on March 28, to repair a leak in the roof of the valve pit.

III. Improvement Experience

A. Projects

CG-558 - Reactor Plant Modification for Increased Production - Work in all buildings is in progress according to schedule with some delay in 181, 190, and 190 Annex Buildings due to labor difficulties and equipment problems covered in separate reports. The 24-hour test run at a flow of approximately 10,400 gpm was completed on No. 8 process pump in 190 Annex Building on March 7. This completed the initial test runs on all eight pumping units.

CG-616 - Installation of Acid Feed Equipment - The facility was accepted by Project Engineering Operation with exceptions on March 29.

IV. Events Influencing Costs

During March, a total of 161.2 hours' overtime was worked by F Power Operation.

Unusual raw water conditions increased chemical costs.

Class "A" Productive Maintenance inspection and repair of No. 1 Boiler.

Increased process water requirements for test operation of 190 Annex Building pumps.

Replacement of wooden lockers at 183 Building with metal lockers.

F RADIATION MONITORING OPERATION

I. Radiation Occurrences

There were three lapses of control during March. The first involved overflow of the 1608 crib; the second an unauthorized entry to a radiation zone; the third, effluent vapor leakage into the 105-F lunchroom. No radiation incident was incurred.

II. External Exposure Control

No dose rate was recorded in excess of 3 rem/hr. A dose rate of 3 rads/hr was encountered while removing the old slug manipulator from the technical viewing pit via the wash pad. Other dose rates of 2 to 2-1/2/hr were noted during removal of a speck on the wash pad and repair of the storage basin vacuum cleaner.

Dose rates on the rear face were higher than normal during the month. Immediately following shutdowns, general radiation background on the rear face was about double previous experience.

At month end, broaching of a highly contaminated channel was done, further increasing dose rates in a limited area on both front and rear faces. Rear face dose rates averaged about 100 mr/hr during reactor outages.

III. Contamination Experience

Two cases of contamination spread outside of radiation zones were noted this month. One case involved effluent vapor contamination in the 105-F lunchroom. The other involved the storage area floor at the 105-F Building, which was contaminated to 4000 c/m by cross traffic after placing contaminated chute repair equipment in the center of the floor.

There were two cases of skin contamination, none of which involved significant exposure.

Numerous specks were found on the wash pad following dummy sorting. Maximum reading taken was 100 rads/hr at one-inch, including 2 r/hr at three-inches.

All air samples taken during the month indicated concentrations of activity below the permissible limits for the respiratory protection being worn.

Activity on the 183-F filter beds has dropped from 45,000 c/m in February, to 5000 c/m at month end.

IV. Events Influencing Cost

A total of 120.4 man-hours of overtime was worked by Radiation Monitoring personnel at 100-F Area during March.

F MAINTENANCE OPERATION

I. Equipment Experience

A. Instruments

During the reactor outage of March 17, a Panellit base check was completed on the east panel. A complete high and low trip check was also made. No gage failures were found; however, approximately 30 stuck toggle valves were experienced.

The cold start-up P.C. chamber failed and was replaced at the 105-F Building.

A modified Beckman, incorporating Design Change 99, was installed in the No. 1 Beckman position at the F Reactor control room.

B. Electrical

During the month, several wiring modifications were completed to the Ball 3X electrical system according to Design Change 161-F.

Failure of the high-speed accelerating contactor on the F Reactor "D" elevator control panel was experienced on March 19. New insulation and contacts were installed.

C. Mechanical

Reinforced counterweight sheaves were installed on the F Reactor "D" elevator.

A chemical mix tank was removed from the 105-F valve pit and installed on the third floor of the 183-F Building for use with the Separan system.

II. Shift Maintenance Activities

Approximately 60 per cent of the available shift maintenance activities were experienced outside of F Area. The main activities within F Area consisted of work associated with the three reactor outages. During the scheduled outage of March 26, a total of 80 process tubes was replaced at a rate of 0.958 hours per tube.

III. Maintenance Engineering, and Planning and Scheduling

A. Instrument Engineering

Bids for the oxygen analyzer and sampling equipment were reviewed.

Investigations of instrument problems relating to the 115-F Building purge system, loop gas flow metering and gas instrumentation at the 105 and 115 Buildings were continued during the month.

B. Electrical Engineering

The efforts of the electrical engineer were devoted primarily to the modification of the Ball 3X "common wiring" and developing uniform modifications of the reactor safety circuit for post CG-558 conditions.

C. Mechanical Engineering

Principal activities of the mechanical engineer consisted of review and revisions of mattress plate prints, development of prints for two types of gunbarrel shields, and an engineering study of various air conditioning problems.

D. Planning and Scheduling

Existing equipment located in the reactor building was checked to obtain additional Productive Maintenance data. Blueprints, BPF's, and instruction books on primary equipment and area systems were made available for training purposes and area use.

IV. Events Influencing Costs

F Maintenance personnel expended 942.3 overtime hours on facilities outside of the F Area, and 330 overtime hours to maintain F Area facilities.

C. N. Gross, Manager
F REACTOR OPERATION

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[redacted]

H REACTOR OPERATION

March, 1957

GENERAL

I. Responsibility

Assigned responsibilities of the H Reactor Operation remained unchanged.

II. Organization

There were no changes in organization or nomenclature during the month.

III. Force Report

	February 28			March 31			Net
	NE	E	Total	NE	E	Total	Change
General	1	1	2	1	1	2	0
Adm. and Pers. Deve.	1	3	4	2	3	5	+ 1
Processing Operation	36	8	44	36	8	44	0
Power Operation	71	11	82	69	11	80	- 2
Radiation Monitoring Oper.	20	5	25	12	5	17	- 8
Maintenance Operation	82	16	98	83	16	99	+ 1
Central Maintenance Oper.	75	14	89	75	14	89	0
Total	286	58	344	278	58	336	- 8

Changes during the month included seven transfers into H Reactor Operation, 13 transfers out and two terminations.

IV. Safety and Security Experience

There were no disabling injuries during the month. Seventeen medical treatment injuries were reported. One security violation occurred when a file cabinet was left unlocked.

Charts depicting number and frequency rate of medical treatment injuries on a monthly and three months average basis were prepared.

V. Personnel Activities

Four exempt employees attended the Process Orientation meeting, two attended the Safety and Fire Prevention meeting and one attended the Data Processing-Commercial Survey course.

VI. Non-Routine Reports Issued

None.

VII. 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.

H ADMINISTRATION AND PERSONNEL DEVELOPMENT OPERATION

I. Administrative Activities

Top secret clearance and repository requirements were surveyed and forwarded to Security and Patrol Operation.

A procedure for routine inspection of 100-H Area motor vehicle lights by the 1716-H garage attendant was established.

Arrangements were made to relocate the Maintenance and Administrative Area bus unloading station to minimize the hazard of walking in front of the bus into traffic.

Evacuation bus requirements were reviewed and forwarded to the Fire and Safety Operation. Three more buses are required immediately and two additional buses will be needed after the dormitories are occupied.

II. Personnel Development

Two of four information meetings for exempt employees and Processing Operation Chief Operators on Cost Accounting Methods and Project CG-558 were held.

Three pamphlets published by the Society for Personnel Administration were distributed to Operation Managers. These were, "Training Your Employee", "The Problem Employee - An Answer for Management", and "Don't Do It Yourself."

III. Cost Control Activities

H Reactor Operation "Cost and Improvement Report" was prepared and submitted to the Financial Operation.

IV. Landlord Activities

Requested the Maintenance Operation to make an engineering study and recommend means of improving the 190-H Building Laboratory and Instrument Shop air conditioning system.

Obtained estimates from Construction Engineering Operation and H Maintenance Operation for remodeling 1704-H Building offices Nos. 48 and 50. Estimates were forwarded to the Financial Operation.

Revised space occupancy and corresponding rental charges for space reassigned to Maintenance, Power, Processing, and Radiation Monitoring Operation.

Survey results of women's rest room facilities were reported to Employee Relations Operation. Work orders and work requests were issued to correct the few deficiencies noted.

H PROCESSING OPERATION

I. Production

Input production of plutonium was 96.8 per cent of forecast. Attainment of goal was jeopardized deliberately in order to take advantage of the tube crew's availability for problem tube work.

Maximum equilibrium power levels were limited by outlet temperatures of 105 C. or tube powers of 750 KW, whichever resulted in maximum production.

The previous record power level was exceeded by 10 units.

II. Operating Experience

A. Operating Continuity

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

Date	Hours	Reason
3- 2-57	184.7	Scheduled outage for tube replacement and charge-discharge.
3-28-57	22.3	Removal of ruptured slug from leaking tube 0983-H.

B. Equipment Experience

February water leak experience dictated a new approach to regular tube replacement. A decision was made to Probolog all tubes having calculated indices of 25 or greater and replace all tubes with measured indices of 31 or greater. This program was vindicated when seven tubes were saved from unnecessary replacement and seven tubes, with walls thinner than calculated, were added to the replacement list.

Malfunctioning VSR No. 51 was inspected during the March 2 outage. A long split was found in the rod casing and boron powder was spilling out. Boroscopic examination of the rod channel revealed protruding blocks which were attributed to shifting during previous channel broaching operations. As substantiated by laboratory analysis, the blow-out was caused by internal expansion, probably from excessive heat conducted by direct contact with the protruding graphite. A development program for heat resistant rods awaits the completion of the metallurgical examination of VSR No. 51.

III. Improvement Experience

A. Production Tests

Production Test, IP-20-AC, which provides for exploring E metal enrichment, got under way on a large scale this month. The 41 tubes of E metal charged increased the effective central tubes to 1610, allowing a 30 unit increase in power level despite a 3 C increase in inlet water temperature.

Twelve spline caps were installed on H Reactor tubes in accordance with Production Test IP-12-AE. The value of poison splines for flattening could not be determined this month because the flattening efficiency was nearly perfect.

B. Hot Ball Separation

The system developed at H Reactor for handling and separating irradiated balls was placed in regular service during March. As a direct result, the maximum radiation level on top of the reactor was reduced from 3 r/hr. to an average reading of 10 mr/hr.

IV. Events Influencing Costs

Overtime usage consisted of 96.5 hours, principally because the March 28 outage had to be manned with overtime help.

A method of packing high pressure helium valves under moderate pressure was exploited, thereby avoiding helium losses of $170.00 for each bank of bottles.

A weekly inspection of all steam lines in the 105-H Building has eliminated faulty steam traps and valves causing unnecessary coal consumption.

H POWER OPERATION

I. Operating Experience

Process water flow was reduced four times for a total of 219 hours. This represents a time operated efficiency of 71.8 per cent.

Water services from the 182-H Building facility were interrupted twice due to inadvertent opening of electrical control circuits by personnel. On March 3, the condenser water service was lost for approximately eight minutes. Process water pressure varied plus or minus 10 psi due to noncondensing operation, however the reactor did not scram. On March 26, the surge suppressors cycled once, but services were immediately restored by 100-B and D Areas.

Pumping of raw water directly from the 181-H Building to 183-H Building was started on March 8. This change results in a net reduction in electrical loads of approximately 15,000 kwh/day at existing pumping loads.

[redacted]

Raw water turbidity varied from 29 to 1100 ppm with a mean of 152 ppm. Corresponding coagulant dose rates varied from seven to 40 ppm with an average of 14.1 ppm. Excellent quality process water was produced during this period and no reactor purges were necessary.

Three test cars of three-inch nut Wyoming coal were received on March 19 to evaluate the feasibility of utilizing this grade of coal during extreme winter periods. This coal crushed satisfactorily and would greatly improve handling during the winter months. Additional evaluations are planned.

The Analytical Laboratories performed routine control services and special analysis on 90 essential material samples, 48 water samples, 41 lubricating oil samples and 35 special analysis.

II. Equipment Experience

Approximately 75 cubic feet of Zeolite was added to each water softener in the 184-H Building to bring the units to the required media depth.

No. 2 storage water tank in the 190-H Building was inspected on March 7. The tank walls are in fair condition, however some pitting of the tank bottom is in evidence. The pitting is localized at the areas in which the protective paint covering is gone.

III. Improvement Experience

Project CG-616 - Sulfuric Acid storage and feed facilities were accepted with exceptions on March 28.

IV. Events Influencing Costs

Water treatment chemical costs increased in March over February due to increased turbidity of the raw water.

H RADIATION MONITORING OPERATION

I. Radiation Incidents

There were no radiation incidents involving overexposure to personnel. Seven lapse of radiation control were recorded. A Supplemental Crews Operation employee received and estimated localized dose of 1140 mrads due to speck contamination on his sock measuring 5.7 mrads/min. Source of the speck is unknown. The other six lapses of control involved three shoe contamination cases and three skin contamination cases.

II. External Exposure Control

One ruptured fuel element was discharged with a maximum personnel dose rate of 1 r/hr.

The residual radiation in the Discharge Area is increasing due to the change of the influent process water chemistry. Personnel dose rates in the Discharge Area have increased approximately 20 per cent.

Five problem tubes were removed via the Charge Face. Personnel dose rates to 4 r/hr were encountered while removing and burying these tubes.

Two VSR's were removed and inspected. During work on Channel No. 51, personnel dose rates to 800 mr/hr were experienced.

III. Contamination Experience

Five cases of skin contamination and 14 cases of shoe contamination were detected. The maximum shoe contamination level was 70,000 c/m, and with one exception, all shoes were decontaminated to less than detectable limits. The shoes that could not be decontaminated were replaced.

Four cases of spread of contamination from radiation zones were attributed to tube removal from the Charge Face.

Routine surveys of the 183-H Building flocculater, settling, and filter basins indicated no significant change in contamination levels previously reported.

Two out of a total of 85 vehicles surveyed during the month were found contaminated. The pick-up truck used to bury contaminated trash could not be readily decontaminated. Since this truck is potentially contaminated at all times, it was decided to make a radiation zone in the bed. The other truck, which was being used to haul contaminated equipment was readily decontaminated to less than detectable limits.

The gross activity in the effluent water had an average integrated dose for 24 hours of 1576.5 mrads. The maximum integrated dose for a 24 hour period was 2824.8 mrads. This increase in activity, primarily due to the increase in mineral content of the river water accompanying spring run-off, is not considered to be a hazard to the aquatic life in the river or in normal use of the river water.

IV. Radiation Training

Most of the effort this month was spent in completing preparations for the presentation of the lecture series to Processing, Power, and Maintenance Operations personnel. A set of show cards was prepared and a cloud chamber purchased for each Radiation Monitoring Operation to be used as training aids with the lectures. Black light equipment has been ordered to permit better demonstration of contamination spread and its control.

V. Events Influencing Costs

A total of 268 hours of overtime was required during the month, primarily to provide monitoring service for tube replacement outages.

H MAINTENANCE OPERATION

I. Equipment Experience

Pressure Monitor - Four rows of new type Hoke toggle valve stems were installed during the March 4 outage in order to locate a type valve stem

which will not stick and will permit the valve to seat properly.

Temperature Monitor - A five-ounce torque drive balancing motor was installed in the Flex-O-Writer fast speed indicator to decrease the over-travel and to achieve greater sensitivity.

II. Shift Maintenance

The major portion of the shift activities were devoted to work in the other 100 Areas and on tube outage at H Reactor.

III. Planning, Scheduling, and Engineering

Oxygen Analysis - A recommendation and cost estimate for additional instrumentation to measure and record the oxygen concentration in the reactor gas was issued.

Safety Circuit - Schematics of the proposed revisions to the No. 1 safety circuit were prepared during the month. Required new system components were ordered with instructions to expedite delivery to meet newest CG-558 shutdown date.

Ball 3X System - A study was made during the month to determine what weak spots exist in the Ball 3X system. The weakest point in the system was found to be the Meletron switch ampere rating. It is planned to replace these Meletrons with Mercoid switches and to relocate them to a clean zone in corridor No. 5 during the Project CG-558 outage.

Ball Flow Regulator for Ball Separator - The Instrument Development Operation is currently working on revisions to the ball separator to further improve the separation of irradiated balls.

Property Management - Physical inventory of all H Reactor Operation uninstalled cataloged property items was completed during March. In April, H Maintenance Operation will formulate a mutually agreeable 100-H Area policy concerning property movements and will serve as the control center for all future transactions.

Productive Maintenance - A review of the productive maintenance work indicates that essentially all jobs were completed during the month except those involving equipment which could not be shut down.

IV. Events Influencing Costs

1. During the report period, 406 hours of overtime were utilized. This is 2.4 per cent which is less than the forecast.

2. Use of H Area Maintenance personnel on out-of-area overtime work.

CENTRAL MAINTENANCE OPERATION

I. Reactor Outage Activity

Stuck charge and rupture removal time during unscheduled outages appear to

be on an increase. Problem tube removal activities are continuing at a slower rate due to severity of the problems remaining.

Below is a tabulation of process tube activities in all 100 Areas:

	B	C	D	DR	H	F	KE	KW	Total
Problem Tube Channels Cleared:			15		7				22
Ruptures Removed:		14			1	1	2		18
Stuck Charges Removed:				2					2
Tubes Pressure Tested:	299		9		57	80			445
Tubes Installed:	67	1	9		57	80			214
Tubes Split and Removed:	67				52	80			199
Scheduled Outages:			1		1	1	1	1	5
Unscheduled Outages:	2		9	3	1	2	4	1	22

II. 108-D Hot Shop

Rebored and polished 115 nozzles for the I & E program at C Reactor. Total to date, 425.

The gasket recess on 100 B Reactor nozzles were rebored to 2.250 inches for use on fringe zone tubes in C Reactor thereby making it possible to release additional C Reactor nozzles for the I & E program.

III. Central Maintenance Engineering

1717-H Shop Tooling - Authorization requests for a No. 2 Cincinnati tool and cutter grinder were written and approved. A near-new machine of exactly the same specifications was obtained from the 2101 Building. This machine is now being installed in 1717-H Building. The excessed machine, a Brown and Sharpe No. 13 tool and cutter grinder, is being skidded and boxed for shipment to 1100 Area.

Authorization requests have been written and submitted for a Maddison rotary grinder, a Norton 10 by 30-inch surface grinder, and a Monarch No. 61 13 by 54-inch engine lathe.

Nozzle Gasket Remover Tests - The nozzle gasket remover was tested on irradiated rear nozzle gaskets during the recent B Reactor outage. The tests were successful, and the tool is being decontaminated to permit the making of drawings prior to further fabrication.

Consultation and research was carried out for Project Maintenance on the need and design for a shielded enclosure to protect the working crews on the "D" elevator. Tests made under actual conditions, using 1/8-inch and 1/4-inch lead sheets, revealed the weight, cost and minimum protection

offered far overshadowed the resulting saving in burnout.

Consultation services were given to Project Engineering on the methods of machining front face nozzles. This revision would convert them for use on rear face of B, D, and F Reactors. A supply of nozzles is now being decontaminated at H Reactor.

IV. Events Influencing Costs

Total cost for March is comparable to the previous month. In-unit maintenance charges were notably reduced.

Increased unit output has resulted from use of Produc-trol system, and other benefits gained by shop centralization. A measurement for the exact cost reduction has not been developed to date.

R T Jessen

Manager
H Reactor Operation
IRRADIATION PROCESSING DEPARTMENT

RTJessen:HCS:CDS:met

KE-KW REACTOR OPERATION

MARCH, 1957

GENERAL

I. Responsibility

The assigned responsibilities of the KE-KW Reactor Operation were not changed during March.

II. Organization

There were no changes of organizational nomenclature during the month.

III. Force Report

	February 28			March 31			Net Change of Total
	E	NE	Total	E	NE	Total	
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	8	34	42	-1
KW Processing Operation	7	36	43	8	36	44	+1
Power Operation	13	75	88	13	76	89	+1
Radiation Monitoring Operation	9	18	27	9	20	29	+2
Maintenance Operation	19	132	151	19	132	151	0
Supplemental Crews	10	64	74	10	64	74	0
	71	362	433	72	364	436	+3

E. Koleber, Supervisor, 100 Operations II, was transferred from Supplemental Crews to the D Processing Operation.

M. W. Marquard, Supervisor, 100 Operations II, was transferred from the B Processing Operation to Supplemental Crews.

H. A. Yount, Processing Chief Operator, was promoted to Supervisor, 100 Operations II and assigned to the KW Processing Operation.

Personnel changes during the month included twenty-five transfers in, one reactivation, twenty-one transfers out and two terminations.

IV. Safety and Security Experience

There were no disabling injuries during the month. Twenty-two medical treatment injuries were reported.

No security violations were occurred.

The K Plant Safety Council held its monthly meeting. Election of officers was held, and the safety program for K Plant, inaugurated on April 1, was formulated.

[redacted]

V. Personnel Activities

R. S. Bell, Manager, KE-KW Reactor Operation, held four meetings with non-exempt personnel to discuss subjects of general and plant interest.

Members of K Plant supervision attended an information meeting conducted by P. B. McCarthy, Equipment Development Operation, on the history, present development and future plans for poison spline control.

A series of meetings conducted by D. B. Hagen were held for Processing and Maintenance personnel, to explain the purpose and scope of a charge-discharge operation study to be conducted at K Reactors.

The Work Simplification Course was completed by R. M. Nelson, D. E. Beaderstadt and J. C. Clausing.

The course in Practical Business Writing was completed by R. T. Woolsey, L. B. Brown and C. E. Nelson.

VI Non-Routine Reports Issued

Comments concerning proposal for Extending "Quickie" Time, HW-4888, Secret, by R. S. Bell.

VII. 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.

KE-KW PLANT ADMINISTRATION AND PERSONNEL DEVELOPMENT OPERATION

I. Administrative Activities

In addition to routine duties assigned to the operation, activities during the month included the following items:

A. A listing of KE-KW Reactor Operation personnel who will require Top Secret clearances as specifically applied to categories VI-b, was submitted to Security and Patrol Operation.

B. Arrangements were made for eight guided tours at various KE-KW Reactor Operation facilities as a part of "Know Your Plant" month. Two hundred and fifteen employees from K Plant and other HAPO components participated in these tours.

C. Eleven IPD Advices were reviewed and comments were submitted to the issuers.

II. Personnel Development

An information and discussion meeting was held for K Plant supervision concerning Reactor Reactivity, with specific emphasis on the K Reactors. G. C. Fullmer,

Manager, Operational Physics Operation, and R. O. Brugge of Pile Physics Application Operation, were guest speakers.

A procedure was established to assist in maintaining continuity of KE-KW Reactor Operation enrollments for the IPD Quarterly Exempt Training Schedule.

V. R. Griffith, Training Specialist, made training contacts with 13 exempt and 100 non-exempt personnel of IPD Power Operations.

III. Cost Activities

Fourteen major "Savings and Improvement Report" items were submitted to the Product Cost and Budget Operation. These items cover the period July, 1956 through March, 1957.

Preparations were made to implement within KE-KW Reactor Operation a revised system of coding the "Distribution of Weekly Salary" forms. This change will primarily aid in the accumulation of overtime charges on a user component basis.

IV. Landlord Activities

The 1704-K Conference Room was enlarged by incorporation of adjacent office space. This improvement was made possible by the relocation of personnel to the 105 Buildings.

KE PROCESSING OPERATION

I. Production

Input production was 96.1 percent of forecast. A new high level, 75 units above the previous record high, was achieved.

II. Operating Experience

A. Operating Continuity

Outage time for the month totaled 208.1 hours. Operating continuity was affected by the following events:

Date	Outage Hours	Remarks
3-1	44.9	Scheduled outage for processing of 418 charges.
3-6	31.3	Unscheduled. Scram due to VSR latch failure. Outage utilized to process 152 charges, necessary maintenance and project work.
3-11	31.3	Unscheduled. AC alternator failure. Outage utilized to process 113 charges, necessary maintenance and project work.
3-17	35.6	Unscheduled. Ruptured slug in 4181-KE. Outage utilized to process 321 charges.
3-19	.7	Unscheduled. Panellit scram.

Date	Outage Hours	Remarks
3-28	.5	Unscheduled. Panellit scram.
3-28	57.4	Unscheduled. Ruptured slug in 2670-KE. Outage utilized to process 541 charges.
3-31	.6	Unscheduled. Spurious panellit trip during startup.
3-31	1.1	Unscheduled. Panellit trip on gage 4981-KE.
3-31	4.7	Scheduled. Poison discharge.

B. Equipment Experience

1. Panellit - All 24 volt supply jumpers were overhauled in an attempt to reduce the possibility of circuit interruption on each row. Mercury separations were corrected in 101 gages. Three plugged sensing lines were cleaned by replacement of the line-to-venturi adapter. Thirty-one new type gages were installed during the month.

2. Ruptured Slugs - Two slug ruptures occurred during the month. Both were discharged with the charge machine although the charge in tube 4181 moved somewhat reluctantly at first. Ruptured slug data is as follows:

	Tube 4181-KE	Tube 2670-KE
Loading	8" cored, D Lot 222	8" regular, K Lot 455
Date Charged	12-27-56	12-27-56
Date of Rupture	3-17-57	3-28-57
Tube Factor	1.204	1.258
Exposure	529	495
Pigtail Reading	100 r/hr.	4 r/hr.
Type	End Cap	Split

3. Vertical Safety Rods - Failure of the holding solenoid on VSR Number 37 caused an outage on March 6. The solenoid was replaced and returned to service. All VSR pistons were vacuumed and cleaned to remove foreign particles that might hinder operation. Fifteen leaking gas seals were replaced. Neutron shields were installed on 10 blanked-off VSR channels.

4. Graphite Thermocouple Stringers - Numbers 5 and 8 graphite thermocouple stringers were installed and placed in service, bringing the operable number to seven.

III. Improvement Experience

A. Production Test IP-43-A-84-MT

Thirty-one tubes were charged with K Lot material in M-388 jackets to evaluate the uniform corrosion resistance of these alloy jackets.

B. Projects

Rear face work was completed on the single pass boiling facility, (tube 3043-KE).

II. Events Influencing Costs

A total of 279.4 hours non-exempt overtime and 24 hours exempt overtime was worked to complete outage work during the month.

KW PROCESSING OPERATION

I. Production

Input production was 118.1 percent of forecast due principally to higher than forecast time operated efficiency at near limiting tube powers. Input production was 104.3 percent of the previous maximum achieved during December, 1956.

II. Operating Experience

A. Operating Continuity

Outage time for the month totaled 75.1 hours. Operating continuity was affected by the following events:

Date	Outage Hours	Remarks
3-1	.4	Unscheduled. Beckman trip due to power surge.
3-7	.3	Unscheduled. Manual scram to keep outlet temperatures within operating limits.
3-7	.2	Unscheduled. Panellit trip during attempted scram recovery.
3-7	32.9	Unscheduled. Insufficient reactivity. Utilized outage to process 301 charges.
3-9	.4	Unscheduled. Panellit ground detector trip during non-equilibrium operation.
3-9	1.1	Unscheduled. Panellit ground detector trip, Beckman trip, and two LLPP system trips experienced during this period.
3-9	1.7	Unscheduled. Panellit ground detector trip during non-equilibrium operation.
3-25	35.7	Scheduled outage to process 382 charges.
3-26	2.4	Unscheduled. Manual scram to keep outlet temperatures within operating limits.

B. Equipment Experience

1. Panellit - Twenty-six Panellit sensing lines were found plugged using the flowmeter check at shutdown flows. These were cleared by changing the line-to-venturi adapter where the plugging took place. Three

[redacted]

of the four Panellit trips experienced this month resulted from grounds on row 30. Gage 3143 was found to have a leaking Bourdon tube and was the probable cause of the grounds. The fourth Panellit trip resulted from pressure variations experienced during the unsuccessful scram recovery on March 7.

2. Vertical Safety Rods - Following the series of scrams on March 9, nine slow reacting VSRs required up to 20 minutes for withdrawal. All vertical safety rod gas seals and one air seal were replaced during the March 25 outage. A special thermocouple gas seal was installed on VSR Number 58 to record rod temperatures during future scram recoveries. Except for VSR Number 27, withdrawal times during start-up were less than three minutes. Examination of this VSR revealed a damaged air seal. The air seal was replaced.

3. Rear Face Ball Valves - Removal of all rear face poison column ball valves was completed during the March 7 outage. Inability to make use of the ball valves under present operating conditions and their interference in use of "Quickie" rupture equipment on adjacent tubes required their removal.

III. Improvement Experience

Design Test Request Number 62 authorizing the installation of a test filter box between the discharge duct of Number 3 fan and suction duct of the Number 1 exhaust fan in the KW Reactor exhaust fan room was completed on March 6. Incorrect filters for the test box required the facility to be shut down on March 8. The filters were changed and the test was resumed on March 14.

KE-KW POWER OPERATION

I. Operating Experience

A. Water Treatment

Raw water turbidity was unseasonably high throughout the month, requiring a record high rate of alum feed. On March 2, the turbidity was measured at 1600 ppm, requiring a coagulant feed of 35 ppm, the maximum capacity of the installed liquid alum facilities. This peak was, however, of short duration.

B. Electrical Peak Control Efforts

A new electrical peak demand was established on March 20. The K generators were at maximum output with 10,000 KW excess being carried at the time of the peak. During the remainder of the month, the generators were operated five hours, representing approximately 44,000 KW hours generated above normal operational requirements to maintain plant demand within the established limit.

II. Equipment Experience

A. Electrical Power Disturbance

The Number 3, 230 M volt incoming line relayed out at 9:24 a.m. on March 10. The breaker was reclosed within two minute and no operating equipment was

effected. The cause of the disturbance was not determined during the subsequent inspection of the line by Electrical Distribution.

B. Loss of Electrical Supply to C and F Busses

During closure of the secondary breaker of Number 4 transformer following maintenance work on the under-frequency relay, the 47 phase sequence and under voltage relay operated. As a result, the 86 K-2 relay tripped and separated busses C and F from BPA, and opened bus tie breaker Number 36. The Number 1 turbo-generator accelerated and assumed the load. Since D bus was being supplied by C bus at the time, the power supply to the 1700 area and Number 2 transformer in 1706-KE was lost. Following an inspection, the secondary relay was closed without further incident, and normal power supply was returned to the D bus.

C. Raw Water Limitorque Valve Failure, 183-KW

On March 5, the 36-inch limitorque valve on the raw water supply to Number 2 basin in 183-KW became inoperative in the closed position. Failure of this valve necessitated supplying raw water to the affected basin through the flume tie valves. Subsequent inspections on March 6 revealed a broken valve disk and torn rubber seal. This damage was caused by loosening of the lock screws on the coupling keyway joining the gear drive to the valve proper, allowing the coupling to drop. The valve disk was pinned in a partial open position pending receipt of the required replacement parts scheduled for delivery May 1. As the result of this incident, inspection openings were cut in the side of the valve standards of all 12 valves of this type in both K filter plants to permit periodic inspection of these critical set screws. The initial inspection afforded by these openings revealed loose set screws on three additional valves. Necessary corrections were made.

D. Debris Removal - 181-KE and KW Forebays

Debris accumulation at the 181-KE and KW forebays necessitated the scheduling of the services of a tug on March 27, 28 and 29, to assist in the removal of this material.

III. Improvement Experience

A. Ventilation Improvements, 165-KE and KW

The project proposal of Ventilation Improvements received final IPD approval on March 27.

B. Maximum 165 Pumping Capacity Tests

A five-pump capacity test at 165-KE and a six-pump capacity test at 165-KW was conducted on March 1 and 7 respectively. The results of these cold reactor tests are being evaluated by Process Engineering personnel.

C. 181-KE Pump Capacity Tests

On March 1, each 181-KE pump unit was tested to determine its performance at maximum flow conditions. Although the test indicated a balanced flow

from the individual pump units, the flow realized did not meet expected capacity, particularly at the higher discharge pressures, on the one pump so tested. Tests were witnessed by Facilities Engineering personnel who are evaluating the tabulated test data.

IV. Events Influencing Costs

A. Overtime Usage

Overtime requirements during the month were normal.

B. Others

The relatively high chemical feed rates required throughout the month resulted in a 35 percent increase in water treatment costs.

KE-KW RADIATION MONITORING OPERATION

I. Radiation Occurrances

No Radiation Incidents were experienced during the month. Two Lapses of Radiation Control were recorded. One Lapse involved the use of a non-regulated trash can for contaminated trash, and the other Lapse involved shoe contamination.

II. External Exposure Control

Silver samples stored in the 3-D Test Facility on the X-1 level of KW Reactor were found to have dosage rates of 5 r/hr at 5 feet. Equipment is being designed to permit remote discharge operations of these samples at a distance of 20 feet to avoid high personnel exposure rates.

Personnel dose rates up to 500 mrads/hr resulted from fission product contamination rising to the surface of the storage basin water during the canning of a ruptured slug at KE Reactor.

Dose rates higher than normal by a factor of four were encountered in the rear face of 105-KW during rupture detection surveys on March 25. These dose rates were attributed to coolant water particle irradiation during the high turbidity period.

III. Contamination Control

Dose rates to 3.5 rads/hr including 100 mr/hr at four inches were measured on the surface of the 105-KE storage basin water surface after a ruptured slug was discharged. No contamination was spread to working areas.

Contamination up to 15,000 c/m was detected on the ground adjacent to the 105-KW badge house after water splashed out of the burial cart as it was being pulled into the exclusion area.

KE-KW MAINTENANCE OPERATION

I. Equipment Experience

A. Instruments

1. Pressure Monitor System - A total of 27 mercury separations were corrected. Adjustments were made to more than 2,597 gages, 78 percent of these being ranges and checks completed during outages. Sixty new Panellit gages were installed in the two 105 Buildings.

2. Temperature Monitoring System - Twelve sensitrol relays were replaced during the month and 114 controller boxes were repaired.

   Of three high pressure trips at 105-KE, one resulted from a faulty switch, the second from a defective controller box and the third was assumed to be a legitimate trip.

3. Sub-Critical Neutron Monitor - Two neutron PC chambers were installed under Number 3 riser in 105-KE for testing purposes.

B. Electrical

1. Horizontal Control Rods - Electrical System - A broken lead in the forward relay circuit caused the "B" HSR group induction regulator to be out of service in 105-KE. HSRs could be withdrawn but not run in. Induction regulator power was substituted from another group via the transfer plug panel while "B" group repairs were made.

2. Instrument Power Supply, 105-KE - A reactor scram resulted when Panellit relays tripped while the instrument supply alternator load was transferring to standby transformers. Voltage surges induced by a faulty pilot exciter tripped the alternator and the automatic transfer was affected. The commutator of the pilot exciter and slip ring surfaces were dressed down and the brushed reseated to correct the difficulty.

C. Mechanical

1. River Pumps - A class "A" overhaul was completed on a pump at 181-KW. Because of the location of this pump, a 30 ton crane was used to lift out the motor and pump assembly. Subsequent to this overhaul, a temporary hoist frame was installed by Minor Construction forces to assist Maintenance in the future overhauls of the two pumps on the river side of 181-KE.

2. General Equipment - 1706-KE and 1706-KER - A Westinghouse pump failed in cell Number 3 of 1706-KER. The shaft and upper bearings were found to be in need of repair. The electrical starter switch and relay also show signs of overload and arcing. The problem is under study by Westinghouse and HAPO engineers.

II. Shift Maintenance Activities

The greater portion of shift activities centered around tube outage work in other areas. The available time in K Area was applied to scheduled overhauls and outage work.

III. Maintenance Engineering and Planning and Scheduling

A. Mechanical Engineering

1. Vertical Safety Rods - Thermocouples were installed in VSR gas seals of both KE and KW Reactors for the purpose of measuring rod temperatures during scram recovery.

   Rod raise tests were conducted in 105-KW, under high graphite temperature conditions, prior to gas seal replacement.

2. 105-K Storage Area Transfer Bridge - Recommendations were forwarded to K Processing Operations to replace the transfer bridges with equipment rated at 3400 pounds.

B. Planning and Scheduling

Class "A" overhauls were completed on 131 pieces of equipment and class "B" overhauls on 228 pieces. Major pieces of equipment included were a 181 river pump, a boiler and its associated equipment.

IV. Events Influencing Costs

A. Overtime Usage

A total of 323.4 hours were worked in K Area compared to 310.0 for last month. Hours worked in K Area:

K Personnel		210.1
Others		113.3
	Total	323.4

Overtime worked in other areas by K personnel amounted to 1281.7 hours.

The total hours worked by K personnel in all areas amounted to 1491.8 which is approximately 189.0 percent of the forecast.

SUPPLEMENTAL CREWS OPERATION

I. Events Influencing Costs

There were 492.2 hours of non-exempt overtime and 28 hours of exempt overtime worked by Supplemental Crews personnel, all of which was charged to the particular area involved.

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

Area	Percent	Area	Percent
100-B	24	100-F	12
100-C	5	100-H	13
100-D	31	100-KE	6
100-DR	7	100-KW	2

R. S. Bell
Manager
KE-KW Reactor Operation

RSB:GEG:prb

PRODUCTION OPERATION

MARCH 1957

I. RESPONSIBILITY

There were no changes in assigned functions or responsibilities.

II. FUNCTIONAL ACTIVITIES

A. Production Forecasting, Scheduling, and Analysis

1. Production Forecasting

The enrichment forecast for the next five-year period was reviewed, and maximum and minimum requirements were established for planning purposes.

A forecast of fringe poison charging for the immediate four-month period was developed in cooperation with the Research & Engineering Operation.

An information document outlining "N" slug requirements for various proposed programs was issued.

2. Production Scheduling

a. Discharge Concentrations

A general modification of the variable goal exposure plan for reactors on 500 MWD/T was made during the month. This change did not affect uranium through-put, but provided for exposure of fringe tubes to a higher goal to permit a slightly lower goal for high-power (rupture prone) tubes. This change affects regular and cored material at all reactors except H.

At F Reactor the concentration cut scheduled for post CG-558 operation has been completed. This was accomplished without incurring a reactivity cycle.

The H Reactor remains on an 800 MWD/T goal, but with tubes above 650 kw tube power on a modified goal of 650 MWD/T maximum exposure.

I & E slug charges at C Reactor were scheduled to be discharged on an 800 MWD/T variable goal with a 1400 MWD/T intercept and a maximum concentration of 850 MWD/T on any tube in accordance with a supplement to Production Test IP-19-A.

Cored material at KE Reactor is being scheduled to be discharged at 600 MWD/T variable goal as in the past; however, the intercept point has been moved to 1000 MWD/T.

C Reactor experienced a series of ruptures in two localized areas. Production Scheduling provided data for use in determining the course of action to be followed in discharging the potentially damaged material from the regions involved. A total of 13.48 tons of material was discharged at approximately 57 percent of goal.

b. Enrichment

Slightly enriched (0.94% U-235) uranium ("E" metal) is available in sufficient quantities to permit scheduling this material into H Reactor as replacement for all "C" metal being discharged. To date 43 tubes have been charged. The Production Test covering charging of this material is being revised to permit charging depleted slugs on each end of future enriched tubes for overall conversion improvement.

c. Fringe Poison

Material for poisoning the top fringe at DR Reactor was scheduled charged on a "crash" basis when shield temperature measurements by Research & Engineering indicated that a potentially serious masonite deterioration problem existed. Production Scheduling assisted in providing and analyzing data for determining the most economical method for initiating the fringe poison program.

d. Process Tube Replacement

Considerable tube replacement work was scheduled during March in spite of a 3X ball drop at B Reactor and project work requiring tube crews at D Reactor. Postponement of the Project CG-651 outage at C Reactor made it possible to schedule this necessary work.

The outage scheduled at H Reactor resulted in replacement of 57 tubes, including recovery of five problem tubes. This outage was cut short by one day due to the 3X ball drop at B Reactor. During ball recovery operations, the tube replacement outage scheduled at B Reactor for the following week was completed (67 tubes) without affecting the length of the ball recovery outage.

Scheduled problem tube work at D Reactor prior to startup from the CG-558 outage resulted in replacement of nine tubes with four tubes not completed. A pre-CG-558 tube outage scheduled at F Reactor resulted in replacement of 80 tubes based on Van Stone flange and external corrosion considerations.

e. Scheduling Shipments from FPD

Advice 5.3.7 covering scheduling shipment of S.S. Materials and certain essential materials from the Fuels Preparation Department was issued and is in effect.

f. Off-Plant Shipments

One cask of irradiated structural samples was shipped to KAPL on March 19.

One cask containing an irradiated fuel assembly was shipped to KAPL on March 22.

One cask of radioisotopes was shipped to ORNL on March 26.

3. Operations Analysis

A brief study was made of the incidence of stuck ruptures at C Reactor during 1955 and 1956. Results of the study were reported to B-C Reactor management.

A study of external tube corrosion was continued. This factor will be evaluated and become a part of the criteria for determining a tube replacement schedule.

B. Computing and Machine Records

The special devices to expand the capacity of the IBM Machine System have, for the most part, been installed. Some difficulties have been encountered in scheduling downtime for those associated with the type 604 Calculator. Consequently, the 604 expansion is about 50 percent completed, and the other machine installations are 100 percent completed.

The development of new IBM card record forms, procedures and machine programs was continued during March. All the necessary scoping has been completed and final procedures, programs and forms are being drafted. To effect these changes in the data processing system and still maintain the necessary work schedules with the present system, the six-day work week for the Specialist and the Programmer has been continued.

Routine evaluations of IBM machine operating efficiencies are in the final stages of development. These evaluations will form a basis for optimizing working schedules and permitting most efficient machine usage.

On Saturday, March 16, and on Sunday, March 31, special data lists were provided the C Processing Operation to evaluate severe slug rupture problems. Emergency call-in of clerical personnel was necessary to prepare these listings.

C. Reports, Statistics and S.S. Accountability

1. Reports and Statistics

a. Daily Reporting

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

Work was initiated to revise the procedure for communicating production statistics to meet changing security requirements.

b. Monthly Reporting

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

A Production Summary for March, with explanation for variance from forecast, was prepared for management on March 25, projecting production estimates and experience to month-end. This summary was supplemented immediately following month-end with statistics showing production as percent of forecast, time operated efficiencies, and an outage-hour breakdown by causes.

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

c. Production Statistics

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

As one phase of a program to improve the graphic presentation of reactor production and related operational statistics, consideration is being given to a central IPD "Chart Room" in Bldg. 1704-H. A letter has been sent to the Level 3 managers to determine their opinions regarding the usefulness of such a Chart Room. It is recognized that security restrictions would require special handling of wall charts showing production data, as well as appropriate control over access to the display.

Other production statistics work performed during February included the following:

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

Rupture and power level information for CY 1956 was supplied the Engineering Auxiliaries Operation.

Reactor outage hours due to 1706-KER for the fiscal year-to-date were furnished the Process Technology Operation.

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

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

Power level, water flow and tube replacement data were given the Process Engineering Operation, Fuels Preparation Dept.

2. S. S. Accountability

The work of drafting the "Description of IPD's Present S.S. Accountability System" was completed early in the month, and this material was forwarded to the Operations Research & Synthesis Operation.

Production Operation views on the subject of tube-by-tube production accounting on a product weight basis (vs. the MWD basis currently used) were developed and transmitted to the central S.S. Accountability Operation. Long-term advantages are seen for a change to the weight basis, but much preparatory work would be required. A discussion meeting with S.S. Accountability personnel has been scheduled for early April.

Contact was maintained with the S.S. Accountability Operation in Relations & Utilities, 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

The work of interpreting Top Secret classification definitions, and resolving associated personnel clearance questions, continued during March. Revised definitions of T. S. reactor production data contained in J. E. Travis' letter to W. E. Johnson dated March 25 were seen to relieve materially the heavy impact on IPD operations which would have attended the January 16 definitions. This was confirmed in a meeting with AEC-HOO Operations Division personnel on March 28, and steps were initiated to inform all IPD Level 3 Operations accordingly. Word of the AEC's new access categories also was received (letter, J. E. Travis to W. E. Johnson, March 20), and plans were made for all T. S. clearance requests to be based on these new categories.

Miscellaneous administrative functions were performed for the Production Operation. These included (1) consolidation and issuance of the February monthly report, (2) continuing liaison with Facilities Engineering relative to assigned office space in dormitory W-20, (3) compiling Savings & Improvement Reports covering the period July 1, 1956 through March 31, 1957, and submitting to the Financial Operation, and (4) furnishing the Security & Patrol Operation a list of personnel for whom the new "Service Access" category suffices.

D. Essential Materials

Rail and truck shipments received in March were as follows:

Carload shipments for IP Dept.	468
" " " other Depts.	264
Truck shipments for IP Dept.	129
Total shipments received	861

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. Schedules were established for the semi-annual coal stockpile surveys made on March 22, 25, 26 and 29 by the Field Survey group of the Construction Engineering Operation.

2. Arrangements were made for the IPD audit group to witness month-end physical inventories of essential materials in 100-D and DR.

3. High turbidity in the Columbia River water made it necessary again to arrange for extra procurement of aluminum sulphate for water treatment.

4. The General Chemical Co. reported that a shortage of sulphuric acid had developed throughout the West Coast area. However, the shortage was expected to be of a temporary nature, and to have only a minor effect on the delivery of HAPO's requirements.

5. During March arrangements were made with the vendor to furnish three additional types of meals on the frozen lunch menu. The wider choice in meals may relieve the monotony which may have contributed to recent complaints on frozen lunch quality.

III. ORGANIZATION AND PERSONNEL

A. Organization

There were no changes in March.

B. Force Summary

	As of 3/31/57			2/28/57	Net
	Ex.	Non-Ex.	Total	Total	Change
General	1	1	2	2	0
Production Forecast'g & Sched.	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

C. Safety and Security

All personnel except one attended safety and security meetings during the month. There were no injuries or security violations. A ten dollar safety suggestion award was presented to W. O. Cook, of Computing & Machine Records.

[redacted]

D. Personnel Activities

J. R. Young attended the second Nuclear Engineering and Science Conference, the fifth Hot Laboratories and Equipment Conference, and the third International Atomic Exposition in Philadelphia, Pa., from March 11 to March 15, 1957. A separate trip report has been submitted.

D. L. DeNeal, Reports & Statistics Analyst, attended the second and final session of a two-session training course in Practical Business Writing.

Four clerks (two each from Computing & Machine Records and Production Scheduling) participated in a "Know Your Plant" tour conducted by the KE-KW Reactor Operation.

Three training sessions in production scheduling and associated problems were conducted by R. W. Bown for supervisors and chief operators from F, KE and KW Reactors.

Each Wednesday during March, groups of KE-KW and F Processing shift personnel have been given tours of the Computing & Machine Records data processing facility in Bldg. 105-H. On March 29, a group of D Area Pile Physicists were given a similar tour.

E. Non-Routine Reports Issued

Document No.	Title	Classification	Author
HW-49467	N Slug Requirements for Mint Production	Secret	AJ Silva

F. 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.

C. A. Priode, Manager
Production Operation

REACTOR OPERATIONS STATISTICS - PROCESSING

MARCH 1957

	B	C	D	DR	F	H	KE	KW	Total	
Input Prod.-Pu(% of Forecast)	78.3	111.5	0	93.2	98.7	96.8	96.1	118.1	101.0	
Time Oper. Eff. (% Overall)	59.8	69.6	0	78.1	71.8	72.2	72.0	89.9	64.2	
No. Reactor Outages										
Scheduled	0	0	1	1	1	1	1	1	6	
Unscheduled										
Scrams	3	3	0	5	0	0	6	7	24	
Other	3	11	0	1	2	1	3	1	22	
Total	6	14	1	7	3	2	10	9	52	
Reactor Outage Hours										
Scheduled	0	0	744.0	68.9	139.0	184.7	44.9	35.7	1217.2	
Unscheduled	298.9	226.0	0	93.7	70.6	22.3	163.2	39.4	914.1	
Total	298.9	226.0	744.0	162.6	209.6	207.0	208.1	75.1	2131.3	
									Total Hrs.	% of Time
Breakdown of Outage Hours										
Charge-Discharge	32.0	43.4	0	77.1	26.5	23.0	126.6	48.2	376.8	6.3
Tube Replacement	103.0	0	213.0	0	87.7	129.8	0	0	533.5	9.0
Project Work	0	27.3	528.0	23.1	7.7	0	11.5	11.1	608.7	10.2
Production Tests	0	(1)37.6	0	0.5	0	0	15.4	0	53.5	0.9
Maintenance	52.6	26.0	3.0	34.5	2.8	12.2	24.6	0	155.7	2.6
Rupture Removal	0	86.5	0	18.0	25.2	32.3	18.4	0	(2)180.4	3.0
Leak Testing	9.4	0	0	0	59.7	9.7	0	0	78.8	1.4
Instruments & Circuitry	10.9	5.2	0	1.6	0	0	11.6	9.7	39.0	0.7
Miscellaneous	0	0	0	7.8	0	0	0	6.1	13.9	0.2
Ball Recovery	91.0	0	0	0	0	0	0	0	91.0	1.5
Total	298.9	226.0	744.0	162.6	209.6	207.0	208.1	75.1	2131.3	35.8
									Total	
No. Slug Rupt. - All Types	0	18	0	1	1	2	2	0	24	
Tubes Installed-Repl. Prog.	67	0	9	0	80	57	0	0	213	
Water Leaks					(3) 4				4	
Tube	0	1	0	0	0	1	0	0	2	
Van Stone	1	0	0	0	1	0	0	0	2	

(1) Includes 18.7 hrs. for removal of Production Test run-to-ruptures.

(2) Includes 32.0 hours for work on tubes necessitated by ruptures which occurred during preceding months.

(3) Leak in "0" ring seal on special rear nozzles.

SECRET Ch-1

HW-49205 DEL

REACTOR OPERATIONS STATISTICS - SLUG RUPTURES
MARCH, 1957

Type Material	Tube No.	Type Rupture	Remov. Hrs.	Charge Date	Rupture Date	Act. Conc.	Lot No.	Removal Method				Remarks
								Quic.	Chg. Mach	Hyd. Jack	Tube & Piece	
8" Reg	2275 H	Unclassified	1.0	11-7-56	3-3-57	505	M-225		X			
" "	2485 DR	Unclassified	2.0	11-24-56	3-5-57	269	M-244	X				
" "	3665 C	Split	10.3	11-23-56	3-11-57	469	K-421		X			2 Ruptures
" "	2461 C	"	0.6	12-17-56	3-15-57	400	K-480	X				
" "	3664 C	")		11-14-56	3-15-57	500	Z-233			X		
" "	3662 C	")		1-3-57	3-16-57	274	TK-477		X			
" "	3659 C	")		10-31-56	3-16-57	520	Z-220		X			
" "	3557 C	")	13.4	12-5-56	3-16-57	385	M-239		X			
" "	3666 C	")		1-3-57	3-16-57	303	TK-485		X			
" "	3759 C	")		10-31-56	3-16-57	537	Z-230		X			
" "	3256 C	"	3.8	10-31-56	3-17-57	546	Z-226		X			
8" Cored	4181 KE	Cap failure	9.6	12-27-56	3-17-57	529	D-22?		X			1/2" core
8" Reg	1964 F	Side Failure	25.2	1-4-57	3-21-57	303	Z-245		X			
8" Reg	2670 KE	Split	8.8	12-27-56	3-28-57	495	K-455		X			
8" Reg	0983 H	Side failure	15.3	11-7-56	3-28-57	605	M-234		X			Water Leak
8" Reg	2466 C	Split	1.6	1-3-57	3-30-57	405	TK-478		X			
" "	2361 C	Split	1.3	12-17-56	3-30-57	464	K-480		X			
" "	2359 C	Split)	17.6	12-17-56	3-30-57	446	K-480		X			
" "	2464 C	Split)		1-3-57	3-30-57	395	TK-497				X	
												Regular metal
PT-IP-42A	0973 C	Unclassified	26.6	2-3-57	3-4-57	117	-				X	control piece
												(water leak)
PT-IP-30A	1080 C	Unclassified	17.8	3-11-57	3-23-57	132	-			X		5/8" core-E
PT-IP-30A	1587 C	Unclassified	0.9	3-11-57	3-25-57	137	-	X				5/8" core-E
PT-IP-30A	3472 C	Unclassified	11.3	3-11-57	3-28-57	195	-		X			5/8" core-E
PT-IP-30A	Determination of optimum core hole size.											
PT-IP-42A	Evaluation of general corrosion characteristics of nickel aluminum alloy in 338 slug jackets.											

SECRET

HW-49205

SECRET

REACTOR OPERATIONS STATISTICS - POWER SHEET 1

		100-B	100-C	100-D	100-DR	100-F	100-H	100-KE	100-KW	TOTAL
WATER FLOW DATA										
RIVER WATER (BLDG. 181)										
TO RESERVOIR	GPM AVG	69764		44720		45210	52387			212081
TO FILTER PLANT	GPM AVG	70371		62000				125200	149800	407371
(C, DR, K)										
TOTAL	GPM AVG	140135		106720		45210	52387	125200	149800	619452
TOTAL	MM GALS	6255.6		4764.0		2018.2	2338.6	5588.9	6687.1	27652.4
RESERVOIR WATER (BLDG. 182)										
TO FILTER PLANT	GPM AVG	53032		36500		41100	49200			
TO COND SYSTEM	GPM AVG	3684		8220		4110	3187			
TO EXPORT SYSTEM	GPM AVG	13048		-		-	-			
TO EXPORT SYSTEM	GPM NOR	-		-		-	-			
TO EXPORT SYSTEM	MM GALS	582.5		-		-	-			582.5
FILTERED WATER (BLDG. 183)										
TO POWER HOUSE	GPM AVG	160		230		374	265	46	17	
TO PROCESS	GPM AVG	51200	65800	24500	64300	37342	46600	117500	140200	
TO DR	GPM AVG			3800						
TO F & S SYSTEM	GPM AVG	50		250		128	102		50	
PROCESS WATER (BLDG. 190)										
TO REACTOR	GPM AVG	50800	65400	24100	63900	36942	46200	117100	139800	544242
	GPM NOR	53000	70300	20000	71100	47700	56300	149400	149500	617300
TOTAL	MM GALS	2267.7	2919.5	1075.8	2852.5	1649.1	2062.4	5227.3	6240.7	24294.6
RIVER DATA										
ELEVATION(MSL.FT.)	(MAX)	387.5		380.1		366.5	372.1	-	382.0	
	(MIN)	385.2		378.2		364.5	369.3	-	379.0	
	(AVG)	386.4		378.9		365.4	370.9	-	380.8	
TEMPERATURE	AVG °F	38.6		41.7		42.1	41.7	-	40.6	

SECRET

W-475, 1-M (1 - 55) AEC GE, RICHLAND WASH

HW-49205 DEL

REACTOR OPERATIONS STATISTICS - POWER SHEET 2

		100-B	100-C	100-D	100-DR	100-F	100-H	100-KE	100-KW	TOTAL
WATER TREATMENT DATA										
AT BLDG. 182	MM GALS									
BLDG. 183	MM GALS	2367.3	3141.4	1629.4	2767.7	1834.7	2196.3	5588.9	6687.1	26212.8
CHEMICAL CONSUMPTION										
CHLORINE (BLDG. 182)	LBS									
(BLDG. 183)	LBS	14775	16600	13355	14745	12122	12600	38000	46600	168797
	AVG PPM	.7	.6	.9	.6	.8	.7	.8	.8	.8
Senaran	LBS	526	280	410	794	387	350	870	730	4347
	AVG PPM	.026	.011	.030	.034	.019	.002	.019	.013	.020
CAUSTIC	LBS							-	-	-
	AVG PPM							-	-	-
ALUM	LBS	373983	343990	235671	394213	271136	257940	828300	1043500	3748733
	AVG PPM	19.0	13.2	17.4	17.1	17.7	14.1	17.8	18.7	17.2
ACTIVATED SILICA ($AS\ SiO_2$)	LBS									
	AVG PPM									
SULPHURIC ACID (AS 100%)	LBS	220450	292226	9518	154161	141634	175824	327200	338000	1659013
	AVG PPM	11.2	11.2	0.7	6.7	9.3	9.6	7.0	6.1	7.6
DICHROMATE	LBS	35475	49740	15525	41450	28449	32931	78650	99100	381320
PURGE MATERIAL CONSUMPTION										
SOLIDS	LBS	0	0	0	0	675	0	0	8450	9125

W-475, 2-M - 55) AEC-GE RICHLAND WASH

SECRET

[redacted]

REACTOR OPERATIONS STATISTICS - POWER SHEET 3

ANALYTICAL DATA		100-B	100-C	100-D	100-DR	100-F	100-H	100-KE	100-KW
RAW WATER									
pH	pH AVG	8.04	8.08	8.07	8.09	8.23	8.08	7.92	7.91
IRON	PPM MAX	-	-	-	-	-	-	-	-
	PPM AVG	-	-	-	-	-	-	-	-
TURBIDITY	PPM AVG	74.8	61.2	148.2	158.0	136.0	152.0	155.0	167.0
FINISHED WATER									
pH	pH AVG	6.89	7.10	7.29	7.03	7.00	7.02	7.05	7.02
IRON	PPM MAX	-	-	-	-	-	-	-	-
	PPM AVG	-	-	-	-	-	-	-	-
TURBIDITY	PPM AVG	.003	[illegible]	.001	.003	.002	.002	.003	.004
Cl_2 RESIDUAL	PPM AVG	[illegible]	[illegible]	.10	.07	.05	.07	.06	.09
DICHROMATE	PPM AVG	1.80	1.90	1.90	1.80	1.86	1.89	1.80	1.90
CHLORIDES	PPM AVG	-	-	-	-	-	-	-	-

STEAM DATA		100-B	100-D	100-F	100-H	B, D, F, H Total	100 KE	100 KW	KE-KW TOTAL
GENERATED (MAX)	LBS/HR	250000	392000	249000	197000	1088000	89000	71000	160000
(NOR)	LBS/HR	115900	150000	232143	181000	679043	-	-	-
(AVG)	LBS/HR	89551	116583	180441	144141	530716	40250	32734	72984
TOTAL	M LBS	66626	86738	134248	107241	394853	29946	24354	54300
TO PLANT	M LBS	56500	73553	113843	90940	334836	26951	21919	48870
COAL RECEIVED	TONS	5174	[illegible]	8034	7347	27388	-	-	
CONSUMED	TONS	5231	5860	8891	[illegible]	26743	-	-	
IN STORAGE	TONS	20172	19618	17426	23282	80498	-	-	
GEN. STEAM / LB. OF COAL		6.37	7.40	7.55	7.93	7.38	-	-	
OIL RECEIVED	GALLONS						156198	88867	245065
CONSUMED	GALLONS						296501	222883	519384
IN STORAGE	GALLONS						1261968	1310977	2572945
GEN. STEAM / GAL. OF OIL							101.0	109.3	104.5

ELECTRICAL DATA			
TOTAL GENERATED KW HRS.	1,579,200	1,652,000	3,231,200

SECRET

W-475, 3-M (1 - 55) AEC GE RICHLAND WASH

SECRET

CD-5

REACTOR OPERATIONS STATISTICS - RADIATION MONITORING

MARCH 1957

	B	C	D	DR	F	H	KE	KW	I.P.D. Total
Special Work Permits Issued	30	55	26	31	16	42	11	5	216
Routine and Special Surveys	606	731	707	383	555	577	450	304	4313
Air Samples Taken	163	63	214	40	110	105	47	34	776
Hand Contamination Cases	0	3	1	0	1	2	0	0	7
Skin Contamination Cases	2	5	2	4	1	3	2	0	19
Contaminated Injuries	0	0	0	0	0	0	0	0	0
Vehicles Contaminated	1	0	1	0	0	2	0	0	4
No. of Cases of Personal Clothing Contamination	4	7	2	1	0	15	1	2	32
No. of Cases of Contamination Spread outside of Radiation Zones	2	13	1	0	2	4	4	1	27
No. of Employees for whom Dose Rates $\geq$ 3 Rads/hr. were established	0	5	0	4	1	15	0	1	26
Lapes of Control (Reactor Operation)	0	8	1	2	3	6	1	1	22
No. of Hours Training Others	6	9	12	13	0	10	0	0	50
Attendance at Meetings for Training Others	36	26	87	88	0	49	0	0	286

SECRET CN-8

[redacted]

REACTOR EFFLUENT DATA								
No. of Effluent Calculations	93	93	*	120	81	85	73	84
Ave. Beta Dose Rate (mrads/hr.)	11.1	19.7	*	13.9	16.4	23.8	21.3	19.5
Ave. Gamma Dose Rate (mrads/hr.)	16.4	25.7	*	21.4	29.6	42.9	28.0	38.9
Ave. Total Dose Rate (mrads/hr.)	27.5	45.4	*	35.3	46.0	66.7	49.3	58.4
Ave. Integrated Dose in 24 Hrs.	625.0	1090.0	*	847.0	1104.0	1576.5	1183.0	1401.6
Max. Integrated Dose in 24 Hrs. in 1957	1490.0	1890.0	734.0	1364.0	1664.8	2824.8	1852.0	2116.4

* 107-D Basin not in operation during the month.

FACILITIES ENGINEERING OPERATION

March, 1957

SUMMARY

Construction completion status of major process facilities at the end of March 1957, was as follows:

Project Number	Title	Completion Schedule*	Completion Actual
CA-512	100-K Area Facilities, Revisions 3, 4, and 5	100	100**
CA-512	1706-KER Recirculating Facilities	100	100
CG-558-I	Reactor Plant Modifications	98	98
CG-558-II	Reactor Plant Modifications	80	71
CG-600	100-C Alterations	81	31

Completion percentages for the design of the reactor proper and of reactor buildings on Project CG-654, "Advance Reactor Design" are summarized as follows:

	Last Month	This Month
Drawings	100%	100%
Criteria	100%	100%
Testing	65%	73%
Weighted Overall	92%	94%

Kaiser Engineers effort for this project is complete.

Recommendations for alleviating the swing characteristics of the boilers operating in parallel at 184-B Building have resulted in changes to the coal handling equipment which diminishes segregation of coal particle sizes. Tests are planned to evaluate the affect of the changes.

The warped VSR's from 105-KE have shown increasing warp since being removed from the reactor. This appears to substantiate the theory that the rods are undergoing progressive stress relief which can be overcome by annealing.

New cracks have appeared during the month in the 105-DR Building which indicates that settlement continues. Foundation repair is being investigated.

CG-558

Examination of the De Laval pumps in 190-B after from 60 to 90 days operation reveals the impellers in the first pumping stage have suffered serious cavitation.

* Per Certified Schedule or Directive Completion Date

** Complete except for revisions and start-up items

[redacted]

Modified wear rings are being installed to reduce the cross sectional area of the impeller eye of these pumps to alleviate the problem until the manufacturer provides two impellers of new design for testing. These are promised in three months.

After a five week shutdown, the project work in 100-D Area was completed and accepted on March 22, 1957, with two exceptions. Reactor start-up was March 29. The outage in 100-F Area commenced March 26, 1957, for tube replacement; project work will start April 1.

Progress of the work in F may be adversely affected by a current jurisdictional dispute between millwrights and electricians. Failure of the millwrights to report to work on March 27 is the first violation of the agreement not to iniate a strike during an outage.

I. RESPONSIBILITY

The responsibilities of the Facilities Engineering Operation remained unchanged during March.

II. ACHIEVEMENT

A. Equipment Experience

A re-check of No. 24 VSR in 105-KE Building was made during the month. Original warpage surveys made during installation in January showed a maximum deviation from a straight line of 0.022 inches. The recent survey showed a deviation of at least 0.086 inches which substantiates the thinking that the rods are undergoing progressive stress relief.

A work order has been issued to have 200 East Area shops stress relieve, anneal, and straighten two of the offending 105-KE rods. A K-type rod from Spare Parts will be included in the order to assist in the evaluation of future design proposals. After heat treating, the rod from Spare Parts is to be sent off-site for surface hardening by nitriding. Upon return, it will be installed in one of the K reactors for operational testing.

The 107-D basin was inspected by Construction Engineering Operation. As was the case at 100-B, no evidence of significant slab movement was noted. The amount of wall leakage at 107-B has become so bad that the use of a bulldozer has been required to control flood water.

Continued observation of the 105-DR Building indicates that settlement continues, new cracks having appeared during the month. The source of settlement originates from downcomer leakage. An investigation of the stability of the building is under way to determine if foundation repair will be required after the downcomer is rehabilitated. Action on the following is in progress:

1. On March 21 two openings were cut in the gas tunnel floor adjacent to each downcomer to check for voids and water.

2. Surveying of the exact extent of settlement is started to check alignment and elevations of the building, high tanks, and stack, to be followed by monthly follow-up checks.

3. The far downcomer was inspected by engineers during the outage of March 21 to determine condition and verify damage reported by DR Processing Operation.

4. Two wells are to be driven to a depth of 25 feet minimum in areas outside the building which show evidence of settlement.

A test has been completed on swing characteristics of three boilers operating in parallel at 184-B Power House using Northwest Industries No. 1 coal. This coal was used because it causes the largest swing in steam production experienced since project CG-558 modifications. Screen analyses showed extreme variations in the size gradation of the coal as fired at each stoker. Since completion of the test, a diversion gate and chute baffles have been installed in the conveyor tripper and a revised procedure for filling the bunker has been initiated. Both of these are for the purpose of abating segregation of coal particle sizes. In addition, a baffle is being installed in the hopper of each crusher and both crushers will be adjusted to permit proper sizing of the coal.

After this work is completed, another test will be run using Northwest Industries No. 1 coal to evaluate any improvement effected by these modifications. At the same time attention will be directed to other factors for improving boiler operation.

B. Improvements

One invention was reported during the month. See attached report of Inventions. The prototype interlock equipment to control poison column discharge-while-operating was used successfully on B Reactor on March 19, 1957, to discharge 23 poison columns. This system will reduce the possibility of uncontrolled flushing of an entire column of poison which would result in a local power surge and will permit poison discharge at a higher power level.

The poison spline program was advanced through laboratory testing, acceptance, and ordering of an advanced prototype spline chopper. New vendor-supplied seals were evaluated. Seals and caps were installed at H Reactor for use in flattening with splines.

VSR development activities were accelerated to keep pace with construction of the test tower, material failures of the K and H Reactor rods, design testing of air-accelerated rods, and anticipated increases in the severity of conditions in which rods will be expected to operate Work is being done to develop improved rods for future reactors.

Current measurements of safety circuit delay times at DR and H Reactors, and VSR fall times for 21 rods at DR and four rods at H Reactor, are within process standards. Testing continues to supply data to determine the need for air-accelerated rods for increased power levels and the need for electrical component developments.

Re-design of the piping systems for unloading CO_2 at 100-B and 100-F Areas has been completed to permit receipt either by railroad tank car or by trucks. A temporary change is being made at 100-B Area to suffice until the system can be shut down and the tank bled-off. The change at 100-F Area is planned to coincide with a future reactor outage, permitting the CO_2 system to be bled and piping of a permanent nature to be installed. Detail drawings of the two systems are being made.

C. Events Influencing Costs

Project Maintenance forces have incurred overtime expenditures approximating 10 percent in connection with the CG-558 outage at 105-D due to: (1) intermittent bad air conditions on the rear face, which necessitated more fresh air and assault mask work than was previously planned; and (2) the fact that Construction Operation does not work certain graveyard and weekend shifts, thus requiring Project Maintenance forces to work these shifts in order to utilize reactor outage time to the best advantage.

Due to the numerous unscheduled outages at 105-C all the Project CG-651 hydraulic and sample line tubing for the rear face has been installed. Although the installation of equipment in a piecemeal fashion is costly to the project, it does save ultimate outage time in the future, which results in an overall saving to IPD. The new ball valves are also being installed during the unscheduled outages.

D. Plant Improvements and Expansion

1. Status of Project Proposals

a. Project Proposals Approved by the Commission

CG-583, Rev. 2, Moisture Monitoring System for Detection of Leaking Process Tubes - 100-B, D, DR, F, and H

CG-584, Rev. 2, Moisture Monitoring System for Detection of Leaking Process Tubes - 105-C

CA-649, Rev. 1, FY-1956 Water Tank Replacement

CG-669, Rev. 1, Water and Gas Leak Locating Equipment - All 100 Areas

CA-697, Rev. 1, Fire Protection Facilities - 1717-B, D, F, H, and 1704-H Buildings

C-709, Vertical Safety Rod Improvements - All Reactors

CG-714, Replacement of Steam Line Support Poles in 100 Areas

b. Project Proposals Submitted to the Commission

CG-558, Phase II, Rev. 1, Reactor Plant Modifications for Increased Production - 100-F and H Areas

CG-638, Rev. 1, Alum-Activated Silica Water Treatment Facilities - Phase II

CA-697, Rev. 1, Fire Protection Facilities - 1717-B, D, F, H, and 1704-H Buildings

C-709, Rev. 1, Vertical Safety Rod Improvements - All Reactors

CG-741, Renovation of the Ball 3X system - 105-C

Ventilation Improvements - Buildings 165 and 190-KE and KW

c. Proposal Preparation Requests Received

Repair of 100 Area Gravel-Surfaced Roofs

Installation of _ Welding Facility at 100-H

A Preliminary Proposal for Advance Design Funds for Replacement of 1200 Steam Line Support Poles, 100-B, D, and F

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

CG-694, Rev. 1, Auxiliary Oil Pumps - 190-C

C-705, Rev. 1, Rod Cooling Water Modifications

2. Plant Engineering

a. Maintenance Program

Work is progressing on setting up the Central Equipment File and about 20 percent of the equipment data cards have been checked and completed.

b. Assistance from Principal Engineers and Others within FEO

Three-phase and ground fault tests of the 13.8 KV system were performed on March 21 at D-DR, Post CG-558. The system showed good stability for all values of power factor above 0.90 lag at 13.8 KV or higher.

Study 56-25 analyzing the economic aspects of operational control of radiation exposure was completed and the findings are being circulated for review prior to issuance of the report. Under certain conditions, annual savings of from ten cents to $2.35 per mr of exposure eliminated may be realized.

The design change to modify the 100-B Area safety circuit to include the dual Beckman trip system is 40 percent complete. The design change to modify the safety circuit in 100-F is 75 percent complete.

A scope report of noise abatement work necessary in the 100 Areas was completed and distributed for review by the Area Managers and other interested parties. When approved by Area Managers, it will form the scope for project proposal action for noise abatement in the following locations: 190-KE, KW, C pump rooms; 182-B, D, F, and H pump rooms; and 165-KE, KW and 190-C control rooms.

Data relating to sand bar accumulation was reviewed with the objective of taking permanent corrective action. The problem was reviewed with the Walla Walla office of the Corps of Engineers, and some progress was made in determining what further measurements will be necessary to define the problem. The present rate of accumulation at 100-H and 100-K Areas indicates that expedient action will be required in FY 1958 to insure proper intake conditions.

c. Suggestion Evaluation

Ninety-three suggestions were received during the month. Evaluations were completed on ninety-two suggestions. Five suggestions were reopened during the month. At month end, a total of 385 suggestions were awaiting evaluation as compared to 379 suggestions at the end of February. Nineteen awards totaling $1,385 in payments were approved.

d. Drafting Services

The summary of services provided is as follows:

	Drawings Involved (Total Number)
New Engineering Drawings	16
Design Changes	3
As-Built Drawings	10
Blueprint Files Services	
Drawings and BPFs Added	265
Drawings and BPFs Refiled	1032
Drawings and BPFs Retired	177
Customers Serviced	322
Vendor Catalogs Added	64
Customers Serviced - Catalogs	37

The drafting backlog remains unchanged while negotiations continue by Construction Engineering Operation to develop a contract for drafting assistance.

3. Design and Development

Category I

Existing Reactor Studies - A preliminary draft of the proposed development program for improved 3X ball handling methods was prepared this month. A number of possible top-removal as well as bottom-removal methods were scheduled for investigation.

A draft of the Plant and Equipment Analysis Report for the K water plant expansion has been completed. Economic evaluation of the proposed changes indicates a pay-off period of one year, using the value for incremental production currently recommended by Research and Engineering. The vendor who supplied the existing 190-K process pumps has stated again that a model pump test will be necessary before a firm commitment can be made regarding expected performance from a modified high-lift pump impeller.

A report, HW-48788, "A Review of Export Reactor Cooling Water System," was issued. It points out that, from a safety standpoint, export water flow to 105-C should be increased to 7500 gpm from the existing 5500 gpm.

Category II

New Reactor Studies - In the investigation of coolant manifolding systems for advanced reactors, application of a pierced crossheader approach appears practical if a suitable connector design and tube-to-nozzle joint can be developed. Work on these problems has been initiated. On the dual crossheader approach, an arrangement drawing was issued during the month for possible future fabrication and testing if funds permit. Extensive testing is required in regard to thermal expansion effects which result from the high operating temperatures. On waterwall development, results of tests on the flow model show that head loss is insignificant, flow pattern is satisfactory and flow behavior is very stable up to the maximum available flow rate.

A document, HW-48481, reporting the results of the Hanford Power Reactor Study was transmitted to the AEC early in March. A supplementary report, HW-48822, which discusses the application of this basic reactor concept to dual purpose operation, was prepared and issued. Study proceeded on the derivation of an organic-cooled, graphite-moderated concept which meets the same functional requirements as outlined in the AEC's Hanford Power Reactor Study request. The effect of a number of design variables is being investigated including process tube material, fuel element geometry and materials, and reactor geometry. This study, which will lead to a document similar to HW-48481, is now approximately 40 percent complete.

On the Improved Production Reactor Research and Development program, request was received from Research and Engineering Operation to

develop preliminary design concepts and rough cost estimates for four different organic-cooled types of production reactors to assist in the evaluation and choice of optimum reactor concept for this program. Work has been initiated on investigation of the problems associated with this type of coolant which have to be explored before meaningful cost estimates can be developed.

Other reactor component development activities carried on this month covered high pressure and temperature process tube connector testing, charge-discharge equipment for pressurized reactors, and high temperature shielding studies.

Preliminary work was completed in support of the Fluidized Bed Reactor study initiated by Chemical Processing Department. This work consisted of rough physics, heat transfer, and economic analyses of such a reactor concept for use as a producer of 300,000 lb/hr steam at 450°F and as a producer of 180,000 KW of electric power. The general conclusion is that the concept shows sufficient promise to warrant further consideration and investigation.

Category III

Plutonium Recycle Program - Service to Hanford Laboratores Operation during the month included a rough draft of a report, "Evaluation of Liquid-to-Liquid and Liquid-to-Boiling-Liquid Primary Coolant Loop Heat Exchangers," which was issued for comment. Two new scope drawings on the PRP Reactor Shim Control System and one schematic piping drawing on the 4X In k System were issued. The shim control element was redesigned to permit the use of gadolinium oxide in place of hafnium. Three new scope drawings which give details of thermal and biological shields for the PRP reactor were prepared.

4. Project Maintenance:

Work Order Data	February	March
Active major work orders	62	61
Individual installations	84	77
Work requested of Maintenance	25,000.	27,500
Unexpended labor dollars	$764,000.	$725,000.

5. Status of Approved Projects

INDEX

[redacted]

CA-512, Revision 5 1952 Hanford Expansion - 100-K Area Facility
Project Engineer: C. E. Love

	Weighted	Scheduled	Actual
Physical Performance:			
Total Progress:		100%	92%
Fixed Price:	8.72%	100%	95%
Construction Operation:	43.30%	100%	85%
Project Maintenance:	47.98%	100%	98%

Average Manpower:		Approx. Accumulated Manpower:	
Fixed Price:	8	Fixed Price:	1355
Construction Operation:	3	Construction Operation:	6380
Project Maintenance:	2	Project Maintenance:	4377

Directive Completion Date:	May 1, 1955*
Beneficial Use Date:	KW - December 5, 1954*
	KE - February 8, 1955*
Authorized Funds:	$155,070,000
Estimated Cost:	$155,070,000

Heat Exchanger Pit

A vent line has been installed in the pump casing in an effort to correct the performance of the PIE pump. Run-in tests will be performed during the next outage.

Pressure Monitoring System

Drawings for the modification to the gages have not been received. Delivery of the switches has started.

Cross-Tie Valves

Work on this item has been delayed due to other work.

Beta Monitoring System

Installation of equipment is now complete and the Acceptance Test is being performed.

* The directive completion date of May 1, 1955, has never been changed, although there has been unofficial agreement to use February 28, 1957, as the completion date for the exceptions listed in Modification No. 5. A letter has been submitted to the Commission requesting an extension of the completion date to June 1, 1957. The beneficial use dates of December 5, 1954, for 100-KW, and February 8, 1955, for 100-KE; are actual, with exceptions still being carried out.

CA-512, Revision 5 1952 Hanford Expansion - 100-K Facility (Continued)

Contract AT(45-1)1157 - Acid Addition Facilities 100-K

The four acid storage tanks have been received and installed. Extensive repairs to insulation will be required to correct damage resulting from shipment. Tie-ins to existing piping have been completed in 183-KW. Other work in K-West is complete except for the acceptance testing.

CA-512 1952 Hanford Expansion - 100-K Area Facilities - 1706-KER Recirculation Loop

Project Engineer: C. E. Love

	Weighted	Scheduled	Actual
Detailed Design:		100%	100%
Physical Performance:			
Total Progress:		100%	100%
Fixed Price:	57.0%	100%	100%
Construction Operation:	42.5%	100%	100%
Project Maintenance:	0.5%	100%	100%

Average Manpower:		Approx. Accumulated Manpower:	
Fixed Price:	0	Fixed Price:	5200
Construction Operation:	0	Construction Operation:	3275
Project Maintenance:	0	Project Maintenance:	150

Directive Completion Date: May 1, 1955
Beneficial Use Date: December 21, 1957*
Authorized Funds: $2,430,000 - GE $1,880,000 - AEC $550,000
Estimated Cost: $2,430,000

This portion of CA-512 is complete except for the adjustment of regulated voltage supply, differential pressure transmitters, and Radiation Monitoring Protection.

* Actual.

CA-548, Revision 3 New VSR Test Tower

Project Engineer: J. C. L. Chatten

	Weighted	Scheduled	Actual
Detailed Design:		100%	100%
Physical Performance:			
Total Progress:		93.5%	63.7%
Fixed Price:	100%	93.5%	63.7%

Average Manpower:		Approx. Accumulated Manpower:	
Fixed Price:	10	Fixed Price:	304

[redacted]

CA-548, Revision 3 New VSR Test Tower (Continued)

Directive Completion Date: June 30, 1957
Beneficial Use Date: Not Established
Authorized Funds: $125,000 - GE $10,500, AEC $114,500
Estimated Cost: $125,000

General construction by contractor is proceeding satisfactorily. The steel delivery was 13 days late, which accounts for the contractor being behind schedule. The AEC does not intend to publish a schedule of added work. Consequently, the work will show behind schedule from now on.

CG-558, Revision 5 Reactor Plant Modifications for Increased Production - Phase I

Project Engineer (Reactor): R. K. Smith
Project Engineer (Water Plant): J. P. Langan

	Weighted	Scheduled	Actual
Detailed Design:		100%	100%
Physical Performance:			
Total Progress:		98%	98%
Fixed Price:	40.82%	99%	99%
Construction Operation:	51.28%	99%	98%
Project Maintenance:	7.88%	81%	94%

Average Manpower:		Approx. Accumulated Manpower:	
Fixed Price:	1	Fixed Price:	46214
Construction Operation:	670	Construction Operation:	181958
Project Maintenance:	38	Project Maintenance:	9627

Directive Completion Date: December 15, 1957
Beneficial Use Date: April 15, 1957
Authorized Funds: $25,900,000
Estimated Cost: $25,900,000

100-B Area Cleanup of the area is continuing. The 151 substation revisions are 100 percent complete and all work orders closed out. Work has resumed on the effluent flume.

100-DR Area This area is complete except for cleanup work.

190-Process Pumps Examination of the 190 process pumps in B Area after 60 to 90 days operation indicated severe cavitation of the first stage impellers in all pumps. Modified wear rings are being installed to reduce the cross-sectional area of the impeller eye of the 190-process pumps to alleviate the problem until the vendor provides two impellers of new design for testing. These are promised in three months.

During the initial full speed test in July, 1956, it was observed that cavitation was occurring at design operating conditions. Periodic inspection

CG-558, Revision 5 Reactor Plant Modifications for Increased Production - Phase I (Continued)

was suggested because the extent of cavitation could not be forecasted. On March 11, 1957, the first inspection was made at 190-B after approximately three months operation. Evidence of severe cavitation was found in the suction eye of the first stage impellers with complete penetration of the impeller vanes in some cases. Mr. A. Hollander, pump consultant from Los Angeles, was retained to study the problem. Measures investigated to provide a solution to the problem included: (1) air injection into the pump suction; (2) operation at the maximum individual pump discharge rate; (3) raising the pump suction pressure by direct connection to the 183 pumps; (4) modification on-site of the vane shape in the impeller eye; and (5) installation of a casing wear ring insert to improve velocity characteristics.

A decrease in cavitational attack obtained by the latter approach is believed to afford a short term solution to the problem, extending impeller life to six months. The pump consultant and the vendor's chief engineer have recommended modification of the impeller vanes, and it is believed that redesign of the impellers will afford a long term solution. The vendor will provide impellers of new design in three months. Interim remedies other than the casing wear ring insert are considered unnecessary. A long range inspection program will be followed, and additional impellers will be ordered.

100-D Area Project outage work was complete March 22 with a tube outage following. During the tube outage, casing wear ring inserts were installed on the 190-D pumps.

In the 105 the downcomer is complete with the exception of minor items. The front face and valve pit modifications are complete and have been subjected to high flows. The installation is being leak tested and the ATF's are in process. The 107 high flow tests have been completed.

In the 151 Area less than one percent of the total work remains to be completed. One compound box to insulate one of the bus joints will be installed during the next bus outage. Accomplished during this report period was the installation of one-to-one current transformers required for the differential relaying in the 230 KV lines. The vendor had furnished five-to-one current transformers for this purpose which delayed the final installation, but did not delay any other portion of the project.

CG-558 Reactor Plant Modifications for Increased Production - Phase II
Project Engineer (Reactor): R. K. Smith
Project Engineer (Water Plant): J. P. Langan

	Weighted	Scheduled	Actual
Physical Performance:			
Total Progress:		80%	71%
Fixed Price:	56.00%	[redacted]	[redacted]

CG-558 Reactor Plant Modifications for Increased Production - Phase II
(Continued)

	Weighted	Scheduled	Actual
Physical Performance:			
Construction Operation:	40.81%	53%	39%
Project Maintenance:	3.19%	83%	53%

Average Manpower:		Approx. Accumulated Manpower:	
Fixed Price:	125	Fixed Price:	35032
Construction Operation:	191	Construction Operation:	27786
Project Maintenance:	1	Project Maintenance:	445

Directive Completion Date:	February 28, 1958
Beneficial Use Date:	September 2, 1957
Authorized Funds:	$11,200,000
Estimated Cost:	$13,100,000

100-F The major outage was started March 26 with the first six days devoted to tube replacement and charge-discharge work. Progress of the work in 100-F may be adversely affected if a current jurisdictional dispute between millwrights and electricians is not resolved immediately. Failure of the millwrights to report to work on March 27 is the first violation of the agreement not to initiate a strike during an outage. No picket line was established; therefore the other crafts reported to work. As of the end of March, the strike had not delayed the outage work in 100-F Area. The millwright work was reassigned to other crafts where this stoppage would affect the plant production.

The 151 Area is approximately 76 percent complete. Included in the original estimate of the work to be performed was time to provide a temporary switchgear setup for test running of the 4500 HP synchronous motors installed by others in the 190-F Building. For the setup, temporary connections were to be used, and cleanup time amounting to 15 percent of the total estimate was allowed. Due to delays in construction caused by the strike of construction forces in 1956, the permanent switchgear was received in time to be installed for the motor tests. The percentage completion indicated is on a new base of the actual work to be accomplished and not the original estimate.

Checking and testing of the relaying and control circuits for all eight 4500 HP motors were completed in the last few weeks.

100-H Work on the effluent line and junction boxes has resumed. The temporary construction piping installation is continuing as process operations permit. Only minor work can be accomplished in the 151 Area between now and the major shutdown.

Revision No. 1 to the project proposal requesting $1,900,000 additional funds was transmitted to the AEC Review Board March 13 and is on the agenda for March 28, 1957.

CG-583, Revision 2 Moisture Monitoring System for Detection of Leaking Process Tubes, 100-B, D, DR, F, and H Areas

Project Engineer: H. A. Zweifel

	Weighted	Scheduled	Actual
Detailed Design:		100%	100%
Physical Performance:			
Total Progress:		100%	90%
Project Maintenance:	100%	100%	90%

Average Manpower:
Project Maintenance: 0

Approx. Accumulated Manpower:
Project Maintenance: 3665

Directive Completion Date: May 1, 1957
Beneficial Use Date: *
Authorized Funds: $293,000
Estimated Cost: $293,000

The test of the system following installation of two bench tested pumps again showed that air was being inducted into the reactor atmosphere at the rate of approximately 11 cubic feet per hour. A line-by-line pressure test has been made and another trial will be made when the reactor starts up. A Revised Certified Progress Schedule - Construction will be prepared.

* B - April 20, 1956, D - May 21, 1956, F - April 30, 1956, H - May 15, 1956.

CG-584, Revision 2 Moisture Monitoring System for Detection of Leaking Process Tubes - 105-C

Project Engineer: H. A. Zweifel

	Weighted	Scheduled	Actual
Detailed Design:		100%	100%
Physical Performance:			
Total Progress:		100%	100%
Project Maintenance:	100%	100%	100%

Average Manpower:
Project Maintenance:

Approx. Accumulated Manpower:
Project Maintenance: 895

Directive Completion Date: March 1, 1957
Beneficial Use Date: January 8, 1957*
Authorized Funds: $72,000
Estimated Cost: $72,000

A project Physical Completion Notice was issued on March 5, 1957. Fabrication and installation of an end panel on the segmental recorder is the only exception.

* Actual.

CG-600, Revision 2 100-C Alterations
Project Engineer (Reactor): J. W. Hedges
Project Engineer (Water Plant): J. P. Langan

	Weighted	Scheduled	Actual
Detailed Design:		100%	100%
Physical Performance:			
Total Progress:		81%	31%
Construction Operation:	83.8%	87%	33%
Project Maintenance:	16.2%	50%	19%

Average Manpower:		Approx. Accumulated Manpower:	
Construction Operation:	20	Construction Operation:	1918
Project Maintenance:	0	Project Maintenance:	250

Directive Completion Date: July 1, 1957
Beneficial Use Date: April 1, 1957
Authorized Funds: $765,000
Estimated Cost: $765,000

Construction Operation forces have started work on the 1904-C diversion box and the tie-in to the existing wye at the 107-C basin. The CG-65J outage in 105-C has been delayed; therefore, toggle valves will have to be installed concurrently with charge-discharge shutdowns.

Full speed operating tests are being performed on the Byron-Jackson pump for 190-C during the week ending March 24. It may be necessary to operate the first unit two or three months and then examine it to determine the extent of cavitation damage.

CA-615 Mechanical Maintenance Shop Centralization - 100 Areas
Project Engineer: J. H. Hoage

	Weighted	Scheduled	Actual
Detailed Design:		100%	100%
Physical Performance:			
Total Progress:		100%	100%
Fixed Price:	61%	100%	100%
Construction Operation:	17%	100%	100%
Project Maintenance:	22%	100%	100%

Average Manpower:		Approx. Accumulated Manpower:	
Fixed Price:	0	Fixed Price:	400
Construction Operation:	0	Construction Operation:	150
Project Maintenance:	0	Project Maintenance:	385

CA-615 Mechanical Maintenance Shop Centralization - 100 Areas
(Continued)

Directive Completion Date: February 28, 1957
Beneficial Use Date: As components are complete.
Authorized Funds: $92,000 - GE $42,000, AEC $50,000
Estimated Cost: $92,000

Physical completion notice issued February 27, 1957, with an indicated underrun of $549.

CG-616 Revision 3 Installation of Acid Feed Equipment 100-B, D, DR, F, and H Areas
Project Engineer: M. C. Patrick

	Weighted	Scheduled	Actual
Detailed Design:		100%	100%
Physical Performance:			
Total Progress:		99%	98%
Fixed Price:	96.4%	100%	98%
Construction Operation:	3.4%	98%	97%
Project Maintenance:	.2%	90%	80%

Average Manpower:		Approx. Accumulated Manpower:	
Fixed Price:	12	Fixed Price:	3670
Construction Operation:	0	Construction Operation:	175
Project Maintenance:	0	Project Maintenance:	10

Directive Completion Date: April 1, 1957
Beneficial Use Date: March 1, 1957
Authorized Funds: $443,200
Estimated Cost: $443,200

All of the facilities are now in use, and work is progressing on punch list items. The project will be closed out with minor exceptions April 1, 1957.

CC-622, Revision 1 Replacement of Discharge Chute Liners - 100-B, D, and F Areas
Project Engineer: G. T. Haugland

	Weighted	Scheduled	Actual
Detailed Design:		100%	100%
Physical Performance:			
Total Progress:		75%	75%
Project Maintenance:	100%	75%	75%

Average Manpower:		Approx. Accumulated Manpower:	
Project Maintenance:	0	Project Maintenance:	1640

[redacted]

CG-622, Revision 1 Replacement of Discharge Chute Liners - 100-B, D, and F Areas (Continued)

Directive Completion Date: July 1, 1957
Authorized Funds: $172,000
Estimated Cost: $172,000

Work at 100-B and D is complete.

No work at F pending a suitable shutdown. Present planning indicates work will be completed during the CG-558 outage.

CG-638 Alum Activated Silica Water Treatment Facility - Phase II
Project Engineer: M. G. Patrick

	Weighted	Scheduled	Actual
Detailed Design:		Not Scheduled	44.3%

Directive Completion Date: April 1, 1957
Authorized Funds: $275,000
Estimated Cost: $57,100

Revision No. 1 to the project proposal was signed by W. E. Johnson on March 18. It is on the review board agenda for March 28.

CG-642 Continuous Charge-Discharge Equipment - "C" Reactor
Design Engineer: H. W. Heacock

	Weighted	Scheduled	Actual
Detailed Design:		84%	84.2%
Physical Performance:		Not Authorized	

Directive Completion Date: November 1, 1957*
Beneficial Use Date: Not Established
Authorized Funds: $200,000 (Interim Authorization)*
Estimated Cost: Not Established

Significant design effort has been suspended pending installation and initial operation of the 112-tube prototype at 105-C under CG-651. The testing program for various equipment components is continuing.

* Design only.

CG-649, Revision 1 FY 1956 Water Tank Replacement
Project Engineer: JA McCool

	Weighted	Scheduled	Actual
Detailed Design:		100%	100%
Physical Performance:			
Total Progress:		40%	33%
Fixed Price:	100%	40%	33%

Average Manpower:
Fixed Price: 1

Approx. Accumulated Manpower:
Fixed Price: 40

Directive Completion Date: July 1, 1957*
Beneficial Use Date: June 3, 1957
Authorized Funds: $58,500 - GE $12,000, AEC $46,500
Estimated Cost: $58,500

The contractor returned to work on March 12, 1957. No work was performed from February 14, 1957, to March 12, 1957, because the contractor was having labor trouble on his last job and could not move his equipment to HAPO.

* Revision No. 1 to the project proposal, requesting an extension of the physical completion date to July 1, 1957, corresponding to the contractor's revised construction schedule, was approved by the AEC Review Board on March 7, 1957. Directive AEC-75, Modification No. 1, was issued March 14.

CA-650, Revision 1 Replacement, Repair, and/or Removal of Valve Houses - 100-B, D, and F Areas
Project Engineer: J. A. McCool

	Weighted	Scheduled	Actual
Detailed Design:		100%	100%
Physical Performance:			
Total Progress:		100%	99%*
Fixed Price:	100%	100%	99%*

Average Manpower:
Fixed Price: 0

Approx. Accumulated Manpower:
Fixed Price: 625

Directive Completion Date: May 31, 1957
Beneficial Use Date: May 1, 1957
Authorized Funds: $65,000 - GE $3,500, AEC $61,500
Estimated Cost: $65,000

* The fixed-price total progress is based on the present contract for twenty-nine valve houses.

CA-650, Revision 1 Replacement, Repair, and/or Removal of Valve Houses - 100 B, D, and F Areas (Continued)

The Architect Engineer has revised the drawings to include the ten additional valve houses in Revision No. 1 to the project proposal.

The AEC is negotiating with the contractor to include the additional work.

CG-651, Revision 1 Continuous Charge-Discharge Equipment - "C" Pile Demonstration Unit

Project Engineer: R. G. Knirck

	Weighted	Scheduled	Actual
Detailed Design:		100%	100%
Physical Performance:			
Total Progress:		62%	65%
Project Maintenance:	100%	62%	65%

Average Manpower:
Project Maintenance: 11

Approx. Accumulated Manpower:
Project Maintenance: 1970

Directive Completion Date: September 1, 1957
Beneficial Use Date: April 1, 1957
Authorized Funds: $350,000
Estimated Cost: $350,000

The twenty-seven shift outage for installing front and rear ball valves originally scheduled for March 18, 1957, was postponed because of high burn-out rates and the effect of this on CG-558 outages. Installation of the CG-651 work is now unscheduled and we are taking advantage of any scheduled or unscheduled "C" outages to complete as much work as possible before the CG-651 outage.

CG-654 Advance Design - Reactor Plant

Design Engineer: J. R. Carrell and M. H. Russ

	Weighted	Scheduled	Actual
Detailed Design:		Not Scheduled	94%
Physical Performance:		Not Authorized	

Directive Completion Date: Not Established
Beneficial Use Date: Not Established
Authorized Funds: $500,000
Estimated Cost: $500,000

Project activity is now confined mainly to the continuation of development testing from funds previously allocated. Although the testing program is somewhat behind the original schedule, it is currently progressing satisfactorily.

CG-654 Advance Design - Reactor Plant (Continued)

Design Status for the reactor and building portion is as follows:

Drawings	100 percent
Criteria	100 percent
Testing	73 percent
Weighted Overall	92 percent

The Kaiser Engineer's portion of the work was 100 percent complete on March 15.

CG-656 Installation of Raw Water Cross-Tie - 105-C
Project Engineer: J. C. L. Chatten

	Weighted	Scheduled	Actual
Detailed Design:		100%	100%
Physical Performance:			
Total Progress:		100%	100%
Construction Operation:	100%	100%	100%

Average Manpower:
Construction Operation: 0

Approx. Accumulated Manpower:
Construction Operation: 210

Directive Completion Date:	February 1, 1957
Beneficial Use Date:	February 5, 1957
Authorized Funds:	$25,000
Estimated Cost:	$25,000

Revision No. 1 to the project proposal was returned by the AEC Review Board on February 14, 1957, with a request to close out the project. with minor exceptions, on the basis of 99 percent completion being obtained February 5, 1957.

The Physical Completion Notice, FEM-3378, was issued February 28, 1957, indicating an underrun of $1,411.

CG-663 Steam Auxiliaries for the 165-K Steam Generators
Project Engineer: D. M. Diediker

	Weighted	Scheduled	Actual
Detailed Design:		100%	100%
Physical Performance:			
Total Progress:		0%*	2%
Construction Operation:		0%*	2%

Average Manpower:
Construction Operation: 0

Approx. Accumulated Manpower:
Construction Operation: 44

* The preliminary work was started December 14, 1956, but a schedule has not been prepared.

CG-663 Steam Auxiliaries for the 165-K Steam Generators (Continued)

Directive Completion Date: August 1, 1957
Beneficial Use Date: Not Established
Authorized Funds: $555,000
Estimated Cost: $555,000

Bid assembly is being prepared by Commission

CG-665 Metal Loading Facilities - 100-B, D, DR, F, and H Areas
Project Engineer: J. C. Major

	Weighted	Scheduled	Actual
Detailed Design:		100%	100%
Physical Performance:			
Total Progress:		11%	19%
Construction Operation:	100%	11%	19%

Average Manpower:
Construction Operation: 6

Approx. Accumulated Manpower:
Construction Operation: 320

Directive Completion Date: November 1, 1957
Beneficial Use Date: August 1, 1957
Authorized Funds: $150,000
Estimated Cost: $150,000

The vendor promises to ship all five of the elevator structures before March 30.

The 105-D elevator pit excavation was started March 12. The elevator pits in 105-D and DR should be complete by the end of this reporting period.

CG-666, Revision 1 Zone Temperature Monitoring - 100-B, C, D, DR, F, and H Areas
Project Engineer: G. L. Swezea

	Weighted	Scheduled	Actual
Detailed Design by CEO:		73%	73%
Physical Performance:			
Total Progress:		7.5%	15%
Fixed Price:	48%	7.5%	15%
Construction Operation:	52%	7.5%	15%

Average Manpower:
Construction Operation: 7
Project Maintenance: 7

Approx. Accumulated Manpower:
Construction Operation: 647
Project Maintenance: 540*

* Estimated.

CG-666, Revision 1 Zone Temperature Monitoring - 100-B, C, D, DR, F, and H Areas (Continued)

Directive Completion Date: January 1, 1958
Authorized Funds: $900,000
Estimated Cost: $990,000

Project Maintenance forces have completed installation of the rear face signal leads at 105-D. Prefabrication of signal leads for 105-F has started.

Information drawings for the controller prototype have been received from Panellit, Inc.

CG-667 Improved Space Utilization - 105-B, D, and F Buildings
Project Engineer: W. P. Nicklason

		Weighted	Scheduled	Actual
Detailed Design	(Architect-Engineer)		100%	100%
	(General Electric)		100%	100%
Physical Performance:				
Total Progress:			52%	52%
Fixed Price:		48%	0%	0%
Construction Operation:		52%	100%	100%

Average Manpower:
Fixed Price: 0
Construction Operation: 2

Approx. Accumulated Manpower:
Fixed Price: 0
Construction Operation: 1000

Directive Completion Date: September 30, 1957
Beneficial Use Date: July 31, 1957
Authorized Funds: $212,000
Estimated Cost: $212,000

The Construction Operation portion of this project was completed March 1. The bid opening was held March 18, with George A. Grant the apparent low bidder. The bids were: low $49,850, high $59,430, and fair cost estimate $46,600. The Notice of Award was issued to G. A. Grant March 19, and work will probably begin by the end of the month.

CG-669, Revision 1 Water and Gas Leak Locating Equipment - All 100 Areas
Project Engineer: C. L. Owen

	Weighted	Scheduled	Actual
Detailed Design:		100%	100%
Physical Performance:			
Total Progress:		100% *	60%
Project Maintenance	100%	100%	60%

* Revised schedule in progress.

CG-669, Revision 1 Water and Gas Leak Locating Equipment - All 100 Areas (Continued)

Average Manpower:
Project Maintenance: 2

Approx. Accumulated Manpower:
Project Maintenance: 515*

Directive Completion Date: October 1, 1957
Beneficial Use Date: August 1, 1957**
Authorized Funds: $190,000
Estimated Cost: $190,000

* Calculated from actual cost as of 2-24-57.

** Beneficial Use Dates

Area	Water	Gas
B	4-12-56	10-15-56
C	-------	--------
D	4-12-56	10-15-56
DR	4-12-56	--------
F	4-12-56	--------
H	8-14-56	8-14-56
KE	-------	--------
KW	-------	--------

CG-674 Water Plant Component Test Loop - Building 1706-KE
Project Engineer: C. E. Love

	Weighted	Scheduled	Actual
Detailed Design:		100%	100%
Physical Performance:		Not Started	

Directive completion Date: December 31, 1957
Authorized Funds: $125,500
Estimated Cost: $125,500

Bid opening for the loop assembly is scheduled for April 15, 1957.

CG-678 Laboratory Facilities for the Special Irradiation Studies
Project Engineer: D. M. Diediker

	Weighted	Scheduled	Actual
Detailed Design (by W. C. Nickum & Sons):		100%	90%
Physical Performance:		Not Started	

CG-678 Laboratory Facilities for the Special Irradiation Studies (Continued)

Directive Completion Date: October 1, 1957
Authorized Funds: $45,000
Estimated Cost: $45,000

Detail Design by W. C. Nickum & Sons has been reviewed and comments have been returned to the Commission.

CG-684 Adequate Fresh Air Systems - 105-B, D, DR, F, and H Areas
Project Engineer: H. A. Zweifel

	Weighted	Scheduled	Actual
Detailed Design:		100%	100%
Physical Performance:			
Total Progress:		90%	42%
Project Maintenance:	100%	90%	42%

Average Manpower:
Project Maintenance: 3

Approx. Accumulated Manpower:
Project Maintenance: 255

Directive Completion Date: June 1, 1957
Authorized Funds: $88,500
Estimated Cost: $115,000*

Compressor bases were poured at D and DR. The rear face installation was completed at 105-D.

Beneficial use of 105-B was achieved on March 8, 1957.

A Revised Certified Progress Schedule-Construction will be issued when information is received from AEC on the action planned on the current financial revision.

* Revision No. 1 to the project proposal, requesting additional funds of $26,500, was reviewed by the AEC Review Board February 14, 1957; AEC is still reviewing costs.

CG-689 Slug Saw and Etching Equipment - 105-C Building
Equipment Development Engineer: P. B. McCarthy

	Weighted	Scheduled	Actual
Detailed Design:		Not Started	
Physical Performance:		Not Authorized	

[redacted]

CG-689 Slug Saw and Etching Equipment (Continued

Directive Completion Date: *
Beneficial Use Date: Not Established
Authorized Funds: $47,750 (Design Only)
Estimated Cost: $100,000

HW-4930, the design criteria for Slug Saw and Etch Facility, is being circulated for approvals. Scope drawings showing the system as proposed in the design criteria are 90 percent complete and will be turned over to the group doing detail design in this condition.

* Anticipated detail design completion May, 1957.

CA-690 Roof Repairs - 190-D, F, and 186-D Buildings
Project Engineer: J. H. Hoage

	Weighted	Scheduled	Actual
Detailed Design:		100%	100%
Physical Performance:			
Total Progress:		100%	100%*
Fixed Price:	100%	100%	100%*

Average Manpower:
Fixed Price: 0

Approx. Accumulated Manpower:
Fixed Price: 292

Directive Completion Date: January 15, 1957*
Authorized Funds: $28,000 - GE $4,500, AEC $23,500
Estimated Cost: $28,000

The Physical Completion Notice was issued March 6, 1957, with an indicated underrun of $557 for the General Electric Company's portion of the project.

* The contractor, C. C. Hill, completed the initial contract work on November 20, three days ahead of schedule. He was notified November 20 by the Commission to proceed with an additional 2,800 square feet of roof repair on the 105-C Building.

CG-694 Auxiliary Oil Pumps - 100-C
Project Engineer: J. F. Langan

	Weighted	Scheduled	Actual
Detailed Design:		Not Started	
Physical Performance:		Not Started	

Directive Completion Date: December 15, 1957
Beneficial Use Date: November 15, 1957
Authorized Funds: $80,000
Estimated Cost: $80,000

CG-694 Auxiliary Oil Pumps - 100-C (Continued)

Revision No. 1 to the project proposal will delete the auxiliary lubricant oil systems for the fluid drives and speed increasers from the scope. The flywheel journal jacking device will be reduced from individual units to one portable assembly.

CA-697, Revision 1 Fire Protection Facilities - 1717-B, D, F, H, and 1704-H Buildings
Project Engineer: C. L. Owen

	Weighted	Scheduled	Actual
Detailed Design:		Not Started	
Physical Performance:		Not Started	

Directive Completion Date: February 15, 1958
Authorized Funds: $94,000 - GE $13,000, AEC $81,000
Estimated Cost: $94,000

Directive No. AEC-105 and the Work Authority were issued March 11. FEM-3385 was issued March 13, 1957, assigning the project responsibility to the Project Engineering Operation.

CA-702 Relocate Dormitories - 100-H Area
Project Engineer: W. P. Nicklason

	Weighted	Scheduled	Actual
Detailed Design by CEO:		100%	100%
Physical Performance:			
Total Progress:		55%	55%
Fixed Price:	100%	55%	55%

Average Manpower:
Fixed Price: 10

Approx. Accumulated Manpower:
Fixed Price: 300

Directive Completion Date: October 31, 1957
Beneficial Use Date: April 30, 1957
Authorized Funds: $120,000 - GE $20,000, AEC $100,000
Estimated Cost: $120,000

The interior modifications to W-17 and W-20 Buildings are essentially complete. Building W-20 has been moved to the 100-H site. The second building will be moved in mid April. Outside power line, piping, and foundation work continues on schedule.

CG-708, Revision 1 Installation of Additional VSR's - KE and KW
Project Engineer: C. E. Love

	Weighted	Scheduled	Actual
Detailed Design:		Not Scheduled	54%
Physical Performance:		Not Started	

[redacted]

CG-708, Revision 1 Installation of Additional VSR's - KE and KW (Continued)

Directive Completion Date: February 15, 1959
Beneficial Use Date: December 15, 1958
Authorized Funds: $379,000
Estimated Cost: $379,000

Of a total of 30 drawings required for detail design two have been approved, seventeen are in the comment stage and eleven are in the drafting stage. The Design Criteria have been approved and issued. Three requisitions have been issued. Work has started on the preparation of an M and E list.

CG-715 Automatic Synchronizers - 165-KE and KW
Project Engineer: D. M. Diediker

	Weighted	Scheduled	Actual
Detailed Design by CEO:		5.5%	9%
Physical Performance:		Not Started	

Directive Completion Date: June 30, 1958
Beneficial Use Date: April 30, 1958
Authorized Funds: $55,000
Estimated Cost: $55,000

Detail Design is proceeding on schedule.

CA-730 Power House Chimney Repairs
Project Engineer: N. F. Fifer

	Weighted	Scheduled	Actual
Detailed Design:		Not Started	
Physical Performance:		Not Authorized	

Directive Completion Date: January 31, 1958
Beneficial Use Date: January 31, 1958*
Authorized Funds: $220,000 - GE $8,550, AEC $211,450
Estimated Cost: $220,000

Directive No. AEC-102 was issued February 1, 1957 and the Project Authorization was received March 12, 1957. General Electric Company will perform the design only.

* As each unit is completed.

AEC-160, Revision 3 Recirculating Gas Loop
Project Engineer: M. G. Patrick

	Weighted	Scheduled	Actual
Detailed Design:		100%	100%
Physical Performance:		Not Started	

Directive Completion Date: Not Established
Beneficial Use Date: Not Established
Authorized Funds: $80,000 (Interim Authorization)
Estimated Cost: Not Established

Drawings have been discussed, commented upon, and are being approved.

Revision No. 3 to the project proposal was written and approved by the Commission March 3, 1957. This revision requests an increase of $170,000 to the authorized funds for construction and procurement of long-lead items.

E. Significant Reports Issued

1. Routine Reports

Monthly Management Report, by J. S. McMahon, for March, 1957.

Semimonthly Project Status Reports, by G. R. Bauer, dated March 8, 1957, and March 22, 1957.

Monthly Record Report, by J. S. McMahon, for March, 1957.

Weekly Activity Report - Project Proposals, dated March 1, March 8, March 15, March 22, and March 29, 1957, by Proposals and Appropriations Operation.

Project Preparation Status Report, by F. A. Snyder, dated March 1, 1957.

General Manager's Monthly Project Report, by G. R. Bauer, dated March 1, 1957.

2. Non-Routine Reports

Number	Subject	Author
HW-48822,	"Economics of Dual-Purpose Operation of a Power Demonstration Reactor, Private and Government Financing," March 6, 1957	W. J. Dowis
HW-45126,	"Project CG-708 Design Criteria, Additional Vertical Safety Rods - KE and KW Reactors," January 10, 1957	G. E. Wade
HW-48764,	"105-DR Trip Tests," February 25, 1957	W. A. Massena
HW-48788,	"A Review of the Export Reactor Cooling Water System Following Completion of Projects CG-558 and CG-600," February 27, 1957	E. L. Etheridge
HW-4887,	"Heterogeneous Lattice Fluidized Bed Reactor Study," March 5, 1957	E. R. Astley
HW-48963,	"Change-Over to CG-600 Process Pumps - 190-C," March 8, 1957.	M. H. Schack
HW-49137,	"Back-up Power Systems for a Power-Producing Hanford Type Reactor," March 19, 1957	D. L. Condotta
HW-49143,	"Composition, Properties and Cost of High-Density Concretes," March 14, 1957	H. S. Davis

	"VSR Temperature Curve," February 22, 1957 (Confidential-Undocumented)	D. L. Condotta
	"Increase in Production Due to Poison Column Control Facility Interlock," March 12, 1957	W. R. Smit
HW-45610,	"Development of Tool to Straighten Graphite Channel," January 31, 1957	J. W. Dodds J. D. Eagen
HW-48392,	"IP-12-AE, Supplement B, PT 105-618A, Poison Spline Flexible Control System," February 11, 1957	P. B. McCarthy G. J. Rogers
HW-48489,	"Evaluation of Projection Fuel Elements for use in Ribless Process Tubes - Final Report," February 15, 1957	J. W. Dodds
HW-48953,	"Interim Report, Safety Circuit and VSR Delays, DR Reactor," March 8, 1957	R. J. Brebrick
	"A.T.P.-2078, Inlet and Outlet Tube Assembly," February 27, 1957	J. E. Robb R. E. Hubbard
	"A.T.P.-2079, Hydraulic Oil Control System," February 28, 1957	J. E. Robb R. E. Hubbard
	"A.T.P.-2080, Auxiliary Water Supply System," March 2, 1957	D. F. Bolender J. E. Robb
	"A.T.P.-2081, Control and Sequencing Circuits," March 4, 1957	R. D. Schilling
	"A.T.P.-2093, Water Sampling System," February 28, 1957	J. E. Robb D. F. Bolender
	"A.T.P.-2094, Pressure Monitoring System," February 28, 1957	J. E. Robb R. E. Hubbard
	"FY 1959 Plant Acquisition and Construction Budget Data Sheets," by Engineering Auxiliaries Operation	
	"Trip Report - Plant and Maintenance Engineering Executive Study Group No. 7 Cleveland, Ohio," January 31-February 1, 1957	E. W. Baker
	"Wood and Preservative Recommendations for Utility Pole Replacement," March 11, 1957	J. P. Corley
HW-49084	"Possibilities for Interrupting the Flow of the Columbia River Upstream from HAPO," March 17, 1957	H. R. Hughes H. A. Kramer

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III. ORGANIZATION AND PERSONNEL

A. Organization

Equipment Development Operation

D. A. Yetter, a Technicial Trainee, transferred in on March 11, 1957
J. L. Humason, a Technicial Trainee, transferred in on March 12, 1957

Project Engineering Operation

J. T. Homer, a Technical Graduate-Rotational transferred out on March 1, 1957.
J. D. Eagen, a Technical Graduate-Rotational transferred out on February 15, 1957.

Plant and Industrial Engineering Operation

H. Hughes terminated on March 29, 1957.

Engineering Auxiliaries Operation

Laura L. Wipperman transferred in on March 18, 1957 from Relations and Utilities.

Project Maintenance Operation

The following employees transferred into the Operation.

L. W. H. Crowley	March 11, 1957
W. L. Apple	March 18, 1957
H. R. Seefeldt	March 25, 1957
R. D. Williams	March 25, 1957

The following employees transferred out of the Operation.

J. F. Earp	March 18, 1957
R. T. Carlson	March 25, 1957
H. L. Madson	March 25, 1957

V. R. Peterson resigned on March 1, 1957 to seek other employment.

B. Force Summary

	February 28, 1957			March 31, 1957			Net Change
	Exempt	Others	Total	Exempt	Others	Tot.	
Employees on Payroll	176	120	296	175	121	296	0
Technical Graduate-Rotational	1		19			17	-2
Technical Trainee			2			4	+2

Following are changes during the month.

	FEO	Tech. Grad. Rot.	Technician Trainees
Payroll Additions	0	0	0
Payroll Removals	1	0	0
Transferred into Operation	5	0	2
Transferred from Operation	3	2	0

C. Safety Experience

There were seven medical treatment injuries sustained during the month.

All components of FEO held safety and security meetings.

D. Radiation Experience

No exposures in excess of permissible radiation limits were reported.

E. Personnel Activities

1. Visitations

Not reported last month was a trip made to Washington State College Institute of Industrial Research by J. R. Carrell and W. J. Morris to observe the water-wall model in operation at maximum available flow. A meeting was held to discuss testing results with Dr. E. Roy Tinney and members of the Hydraulics Research Laboratory.

H. R. Kosmata visited Sylvania Electric, Long Island, N. Y., to discuss ceramic fuel elements. He also attended the Nuclear Engineering and Science Conference in Philadelphia, Pennsylvania.

H. S. Davis attended the Structural Engineers Conference March 17, 18, and 19 at the State College of Washington. Mr. Davis visited the North Pacific Division Laboratory of the Corps of Engineers, Troutdale, Washington on March 25 to hold technical consultation on an extended program for testing of high density concrete.

M. H. Russ visited Dr. Aladar Hollander at the California Institute of Technology, Los Angeles, California, to discuss pumping problems, Project CG-558. During the week of March 25 Mr. Russ visited General Electric, Schenectedy to observe electrical board studies in connection with Project CG-654.

W. D. Bainard visited the Shell Oil Company, Anacortes, Washington, March 18 to obtain information on pumps for hot organic fluid.

J. R. Carrell and D. B. Lovett visited OMRE, Idaho Falls, Idaho, March 28 and 29 to observe an organic coolant installation and

[redacted]

discuss technical problems.

Mr. Aladar Hollander, consultant of Los Angeles, California, visited HAPO from March 14 to 23, 1957, to provide advice on solutions to the CG-558 process pump problems.

Mr. Hans Gartmann, Chief Engineer of the Centrifugal Pump and Compressor Department of the De Laval Steam Turbine Company, Trenton, N. J., visited HAPO from March 14 to 23, 1957, to review problems associated with the CG-558 process pumps.

D. F. Watson was assigned to Declassification Review at Oak Ridge from March 6 through March 22.

At HAPO on March 4, 5, 1957, C. W. Botsford and C. E. Frantz consulted with J. K. Figenshau and H. C. Johnson of General Mills Company, Minneapolis, Minnesota, on the negotiation of a contract for the remote manipulator.

At HAPO on March 21, 22, 1957, C. W. Botsford and R. M. Smithers consulted N. H. Wood of General Engineering Laboratories, Schenectady, New York, on the general subjects of material problems and material-handling problems for remote equipment operation.

P. B. McCarthy visited Handcrest, Incorporated, Seattle, Washington, on March 15, 1957, to discuss techniques for fabrication of poison splines. On the same day upon the invitation of the Bellevue High School Science Class in Bellevue, Washington, he spoke to approximately 50 students and guests and used approved material, "Hanford Adventure," and a film, "A is for Atom".

R. R. Henderson visited Linberg Steel Testing Company, Arrowhead Rubber Company, and Ampco Metal Incorporated in Burbank, California; The American Brass Company in Los Angeles, California; Solar Aircraft Company, and Ryan Aircraft Company in San Diego, California, on March 6 10, 1957, for materials for VSR and VSR seals.

R. Sherrard visited Berkeley Division of Beckman Instruments at San Francisco, California; Beckman Systems Division at Los Angeles, California; Arnoux Incorporated at Anaheim, California, on March 10 17, 1957, to obtain development information relative to passive scanning, temperature high limits R.T.D.'s and analog-to-digital converters.

A. G. Dunbar visited the following companies on February 16 to March 2, 1957, to find an acceptable source of halogen-filled GM tubes and dadium-sulfide crystals for use in the fuel rupture detection development work, and to obtain engineering data concerning these two transducers: G. E. X-Ray in Milwaukee, Wisconsin; Radiation Counter Laboratories in Skokie, Illinois; General Engineering Laboratory, Schenectady, New York; Raytheon Manufacturing Company, Newton, Massachusetts; New York Office AEC Labs, New York, N. Y.; and Anton Laboratories, Brooklyn, New York.

C. H. Gydesen visited the Pacific Plastic Exposition in Los Angeles, California, on March 20, 21, 1957, to discuss wire insulation, impellerblade coatings, and new materials in general. On March 22, 1957, he visited Viking Industries, Incorporated, Canoga Park, California, to discuss water-proof electrical connectors.

E. Hollister visited the following companies for the purpose of vendor contact and conference on an equipment study to solve tube replacement problems: Thor Power Tool Company, Aurora, Illionis, on March 18, 1957; Gardener-Denver Company, Keller Tool Division, Grandhaven, Michigan on March 19, 1957; Ingersoll Rand Company, Athens, Pennsylvania, on March 20, 1957; Biach Industries, Cranford, New Jersey, on March 21, 1957; Gustav Wiedeke Company, Dayton, Ohio, on March 22, 1957.

As part of the activity on reporting on Columbia River flow conditions, H. A. Kramer and H. R. Hughes visited the Rock Island Dam on March 5, 1957.

2. Training

A four day Work Simplification Seminar was conducted for "B" shift personnel. The success of this initial attempt of a course given on a continuous basis justifies consideration of a similar approach in the future.

Training classes for CG-651, Charge-Discharge, were conducted in the Instrument Warehouse at White Bluffs. Approximately 89 craftsmen and supervisors have attended sessions to date. Classes were conducted in 200 West Area on the operation and safety features connected with the use of Ramset powder-actuated tools.

Plant Engineering Operation personnel toured the 300 Area production facilities for the purpose of observing 300 Area mechanization.

Exempt personnel were given the opportunity to attend an Information Meeting given in conjunction with the Personnel Development Program for 1957 at 100-F Area.

Manager
Facilities Engineering

DECLASSIFIED

REPORT OF INVENTIONS
FACILITIES ENGINEERING OPERATION
IRRADIATION PROCESSING DEPARTMENT
MARCH, 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.

Inventor	Title
H. F. Jensen	Air Cooling of Vertical Safety Rods

Manager
Facilities Engineering

EMPLOYEE RELATIONS OPERATION
March 1957

PERSONNEL DEVELOPMENT & COMMUNICATION OPERATION

General

No change in organization nor assigned responsibilities occurred during the month. The force remained at the previous total of seven, including four exempt and three non-exempt. No lost time or medical treatment injuries nor security violations occurred.

The Specialist, Supervisory and Craft Training attended a depth interview course in Schenectady during the week of March 25.

Communication Activities

The Department's Oral Communication activities included two Management Information Meetings conducted by the General Manager and two meetings held for Employee Relations people by the Manager - Employee Relations.

Mass communication activities included the publication of five Management News Bulletins, initiation of one Priority Message, which concerned the winning of the Central Safety Council Award, and distribution of one health bulletin. Three "Union Relations Information" bulletins were issued, of which the Communication Specialist edited two and prepared one. Also, four copies of "Management Information for Foremen and Supervisors" were distributed throughout the Department.

More than the usual amount of attention was devoted to the "GE Review" during March. The March issue was distributed and a review was initiated to bring distribution lists up-to-date and, if possible, reduce the number of copies distributed. In addition, certain Level #4 Managers were contacted in an effort to stimulate submission of articles for publication in this periodical.

Copies of the recently approved Department Communication Program were distributed to all IPD Managers with a cover letter signed by the General Manager.

An Index of Employee Relations and Financial Functions, including the names and telephone numbers of individuals to contact for information, was distributed to all IPD exempt people.

A review was made during the month of the mailing lists for the various publications distributed by the Public and Employee Relations Services. Revisions to IPD distribution were made.

GE News coverage included the usual suggestion awards, safety promotion and attendance recognition. In addition, several issues included the latest news of the move of the two dormitories to 100-H Area and appropriate attention was paid to IPD's winning the Central Safety Council Award. The 100-K Area's "Know Your Plant Month" was publicized, as was the holding of a Work Simplification seminar. The GE News item of major interest during the month was a two-page feature on the Central Maintenance Operation.

An indication of the extent to which the GE News is utilized as an information medium may be obtained from the following tabulation:

	This Month	Last Month	Year to Date
Photos:			
No. Published	41	24	75
Column Inches	448	266	801
Text-Column Inches	34	35	116
Total-Column Inches	482	301	917

Four papers prepared by IPD people were processed for Public Relations' review and approval:

"Limitation of Scram-Transient Calibration" - J. H. Brown

"Composition, Properties and Cost of High-Density Concretes" - H. S. Davis

"Some Observations on Personnel Development in Industry" - M. L. Mickelson

"Medical Care Insurance" - G. V. R. Smith

One signed article prepared by an IPD employee, was processed for Public Relations' review and approval:

"Weight Measurements in Multi-Bunker Installations" - W. D. Hamilton

Personnel Development Activities

The Exempt Manpower Inventory for IPD was approximately 55% completed. Nine out of sixteen fields of information have been keyed to individual cards. To date the yet incomplete Inventory has serviced two requests for information of a general nature.

Compilation of data from the Personnel Inventory charts continued. In order to determine back-up reserve strength for each Level #4 and #5 position in IPD a file and summary tabulation was prepared. From preliminary analysis of the data it appears that adequate back-up exists for the majority of exempt supervisory positions.

At the request of the Educational Specialist in R & U a review of the G. E. School of Nuclear Engineering 1957-58 curriculum was made. Suggestions were submitted for possible additions to the program in the non-technical area.

General agreement has been reached on several changes in the administration of the Tech. Grad. Rotational Training Program. The modifications, presently being drafted in final form by the Program Supervisor in R & U, provide for better uniformity in the program and equitable assignments among the several Departments and Operations. Approximately twenty-four out of thirty descriptions of IPD rotational assignments available to Tech. Grads. were re-written for inclusion in a new manual which will be issued by R & U. The FY 1958 Budget Forecast for rotational trainees was again reviewed and revised downward in light of the decrease in the number of Tech. Grads. the recruiting office predicts will be hired this year. The present status of assignments by Operation is as follows:

Assignment	No. of Transf. Out	No. of Transf. In	No. Present At End of Mo.	No. Off-Program Assignments to IPD This Mo.	No. Off-Program Assignments to IPD Since 1/1/57
Research & Engrg.	1	0	18	0	4
Facilities Engrg.	5	2	14	0	5
B-C Reactor	0	0	0	0	0
D-DR Reactor	1	1	2	1	1
F-Reactor	1	0	0	0	0
H-Reactor	0	0	0	1	1
K-Reactor	0	0	3	1	1
Totals	8	3	37	3	12

The PBM-I course progressed satisfactorily. Each of the four groups has now completed twelve of the twenty scheduled sessions.

Work began on the review of existing records previously submitted to the Engineering Services Register and the Manufacturing Services Inventory for IPD personnel. Revisions as necessary to up-date the record will be made and information submitted on additional people who should now be included on these two functional registers.

Exempt employee training classes progressed satisfactorily, with good employee attendance and interest exhibited. The schedule of classes with current month and year-to-date attendance for each is shown below:

	This Month	Last Month	Year to Date
Management Orientation	0	7	14
G.E. Salary Plan and Its Administration in the IPD	0	0	12
Financial Operation	0	0	12
IPD Radiation Protection Program	12	10	12
Practical Business Writing	11	15	15
G.E. Employee Benefit Plans	0	22	22
Labor Management Relations	0	18	18
Process Orientation	18	0	18
Safety & Fire Prevention	12	0	12

The backlog of re-evaluations in the Supervisory Selection Program was completed early in the month. Greater attention can now be given to the substantial number of new nominations to the program presently outstanding. Month-end status of this activity is shown in the following tabulation:

	This Month	Last Month	Year to Date
New Evaluations completed	0	2	3
Evaluations under way but not complete	2	2	
Re-evaluations performed	6	40	61
Re-evaluations under way but incomplete	3	6	
Re-evaluations outstanding	10	6	
Nominations outstanding	40	40	
Appointments from the Program	0	1	2
Total candidates in the Program	156	156	

In the Non-exempt Personnel Development Program categorizing of information on completed appraisal forms has not started due to the press of other work. As indicated below, there is need for improvement in prompt return of completed appraisals.

	This Month	Last Month	Year to Date
Number of Appraisal Forms Distributed	146	128	392
Number of Completed Appraisals Returned	123	73	249

PERSONNEL PRACTICES

General

There were no changes in organization nor in assigned responsibilities during March. One minor injury, a paper cut, was sustained by a Motor Messenger. There were no security violations. A total of 40 overtime hours was worked, all by Duplicating personnel. The Manager - Personnel Practices presented the speech, "The Challenge of Atomic Energy" to the Chemical Engineering Society of Brigham Young University, and also at the banquet of the annual meeting of the Pacific Fisheries Technologists.

FORCE

	Beginning of Month	End of Month	Net Change
Exempt	6	6	0
Non-Exempt	17	15	- 2
Total	23	21	- 2

One General Clerk transferred out of the group early in the month. One Secretary terminated for personal reasons; she is to be replaced.

Technical Personnel Placement

1. PhD Activity

Eight PhD candidates were interviewed by IPD representatives this month, resulting in four employment offers. No acceptances have been received from these PhD offers to date. PhD activity is increasing and will be considerably greater in April.

2. BS-MS Recruitment (Experienced)

	March	February
Active Cases Centralized by IPD	11	10
Candidates Centralized by Other Depts.	16	20
Offer Letters Processed	1	0
IPD Offers Accepted	0	0
IPD Offers Rejected	0	1
Offers Candidates Considering	3	2
New Hires - IPD	0	0

College recruitment direct placement candidates are continuing to be processed at a high rate. Two additional requisitions are being processed for IPD centralized candidates.

3. BS-MS Recruitment (College)

The Specialist - Technical Personnel Placement recruited BS/MS technical personnel as a member of the Company's Western Region Engineering recruiting team at the University of Santa Clara on March 18.

4. Transfers and Terminations

	March	February
Active Cases Within IPD	15	16
IPD Interest from Other Depts.	8	6
Transfers, Other Dept. to IPD	0	2
Transfers, from IPD to Other Depts.	0	1
IPD Transfers to Other GE Sites	0	0
Terminations	2	2

One termination was from FEO, the other from Financial. Both employees terminated to accept employment elsewhere.

5. Military Reactivates

	March	February
Active Cases in Process	4	4
Offers Extended	0	1
Offers Accepted	0	0
Offers Rejected	1	0
Offers Being Considered	1	2

Communication is being established with three additional service reactivates; follow-up will be undertaken when the extent of their HAPO interest is determined.

6. Summer Placement Program

	March	February
Active Cases in Process	5	7
Offers Extended	0	7
Offers Accepted	1	5
Offers to Visit	0	2

We have assigned five professors for the summer in IPD, which completes professor placement for this year. We have placed one additional graduate student for a total of three, and will work on the placement of the Juniors in April.

Employment

1. Employee Service Recognition Plan

Years of Service	Number of Awards This Month	Number of Awards 9-1-56 to Date
5	14	129
10	17	83
15	1	1
20	0	0
25	0	0
	32	213

Arrangements have been completed to receive IBM runs on continuity of service in advance, thereby making possible the distribution of service awards on a current basis.

2. Attendance Recognition Plan

Years of Perfect Attendance	Number of Awards This Month	Number of Awards 9-1-56 to Date
1	15	90
2	13	68
3	13	52
4	2	30
5	3	27
6	2	13
7	3	7
	51	287

3. Requests for Transfer

	Non-Unit	Unit	Total
On Hand 2-15-57	3	33	36
New Requests Received	2	4	6
Transfers Completed	1	1	2
Requests Cancelled	1	2	3
Interviews Conducted	1	0	1
Requests on Hand 3-15-57	3	34	37

4. Personnel Changes, 2/16/57 to 3/15/57

Additions to Payroll:		9-1-56 to 3-15-57
New Hires	2	16
Re-Engaged	0	1
Reactivates	6	23
Transfers	12	86
Re-Hires	0	12
	20	138

Removals from Payroll:		
Deaths	0	2
Retirements	1	8
Terminations	5	59
Deactivates	9	34
Transfers	4	48
	19	151

5. Requisitions

No. of Openings as of 2-15-57	25
Additional Openings, 2-16-57 to 3-15-57	10
Openings Cancelled	10
No. of Openings Filled	17
No. of Openings as of 3-15-57	8 *

* Commitments have been made on 6 of the existing openings and two of the openings are on a "hold" status.

6. Disciplinary Action

	March	9-1-56 to 3-31-57
Employee Contacts Received	1	5
Warning Notices Received	0	1
Discharge Notices Received	0	0
Suspension Without Pay Cases	0	0
	1	6

Employee Benefits and Services

1. Military Service

The military status survey is virtually complete, returns being 99.5 percent. Of the questionnaires outstanding, only three apply to personnel who are not over age limits.

		March	February
Interviews:	Total	4	4
Preparation of Requests for Deferments		4	4
Returned from Military		0	0
Letters Requesting Deferment or Reclassification:	Total	4	4
Deferment in S.S.S. Draft		2	3
Reclassification of Stand-by Reserve Availability Status		2	1
Deferments allowed for one year		5	4
Deferments denied for one year		1	0
Deferments appealed (State Board)		1	0

2. Employee Purchases

Special Purchases handled by this office	1	0
Complaints by employees investigated and resolved	0	1
Letters written to obtain special G.E. goods	3	0

	March	February
3. Retirement Program	2	4
4. Employee Loans		
Educational loans initiated	0	1
Educational loans completed	0	0
5. Deceased Employees	0	0

Mail and Duplicating

1. Mail and Addressograph

The revised Plant Telephone Directory was received, and distribution to all IPD offices completed during the month. Two priority Management News Bulletins were addressographed and distributed.

Statistics

	March	February
Pieces of registered delivery mail	1,936	1,961
Pieces of postal mail	439	380
Pieces of regular mail	326,185	391,461
Number of addressograph orders handled	20	26
Number of addressograph impressions	11,510	11,457

2. Duplicating

The 1709-H duplicating office is providing priority service on duplicating requests from IPD Financial Operations located in 700 Area. In spite of mailing and/or travel time, this office is more able to meet deadlines than those located in 700 Area.

On March 7th, the class, Printing and Duplicating Methods, was presented for 100-B clerical and stenographic personnel. A total of five classes have now been conducted for personnel in each of the 100 Areas.

During the month, new Verifax and Xerox accessory equipment was received and placed in operation.

Statistics

	March				February
Off-Set	100-H	100-D	100-K	Total	(Total)
Orders Received	565	223	316	1,104	1,256
Orders Completed	576	284	330	1,190	1,341
Orders on Hand	1	12	0	13	12
Xerographic Masters Made	483	208	---	691	620
Total Masters Handled	2,465	897	1,011	4,373	4,677
No. of Copies Duplicated	203,779	33,681	52,801	290,261	282,167

Statistics

Verifax	March	February
Orders Received	78	89
Orders Completed	78	89
Orders on Hand	0	0
Total Masters Handled	501	1,120
No. of Copies Duplicated	1,638	3,855

UNION RELATIONS

The Bureau of Labor Statistics' cost-of-living index continued to rise and on February 15 reached a new high of 118.7. March 15 is the next base period on which wage adjustments are to be based. If the index remains at the present level, nonexempt employees will be entitled to a 0.59% increase in base rates. An index figure of 118.9 will call for a base rate increase of 1.18%.

There were no developments in March regarding the Hanford Atomic Metal Trades Council's charge of unfair labor practice pertaining to certain work being performed in Buildings 1706-KE and KER. As reported last month, a statement of the Company's position in this matter was filed with the National Labor Relations Board on February 28.

Sixteen of the 23 grievances received this month were on the subject of overtime distribution. Ten of these grievances were received by Project Maintenance Operation pertaining to one incident of scheduling overtime for Instrument Craftsmen. An area meeting was arranged between management and the craft stewards which served to "clear the air" on this incident and resulted in these grievances being settled satisfactorily at Step I.

To achieve prompt dissemination of information concerning settlement of grievances, the Communication Specialist has been assigned to attend all Step II Grievance Meetings in the future and prepare communiques on grievance settlements for immediate distribution to supervisors. The Manager - Union Relations, however, will retain full responsibility for the subject matter.

One request for arbitration of a grievance was received during the month and one previous request for arbitration of another grievance was withdrawn. The grievance for which arbitration was requested involved a dispute whether an overtime assignment was scheduled or call-in overtime. The arbitration request which was withdrawn involved a grievance filed by a Sign Painter who claimed jurisdiction for "servicing" the safety marquees located near the main gates of the 100 areas.

Three meetings were held this month with members of the IPD Industrial Relations Committee to discuss union relations matters. Also, on three occasions during the month, a representative of Union Relations met with H Reactor Operation supervisors as a part of an information meeting conducted by the manager of that Operation.

IPD Grievance Statistics 2-23-57 through 3-21-57

A total of 23 grievances were received and three Step II grievance meetings were held. Following is a breakdown of the status of these grievances:

	Unit	Non-Unit
Received this month	23	0
Received this year	52	0

[redacted]

Step I	Unit	Non-Unit
Answer unsatisfactory	11	0
Answer satisfactory	12	0
Pending time limit	7	0
Settled this month	13	0
Step II		
Discussed this month	5	0
Pending time limit	2	0
Settled this month	6	0
*Arbitration Pending	2	0
Total Settled This Month	19	0

*Step II grievances which the Council has formally indicated their intention to arbitrate are shown settled at Step II after three months, if no further action is taken.

Subject of March Grievances

Unit	B-C	KE-KW	D-DR	H	F	Fin.	Emp. Rel.	Fac. Eng.	Res.& Eng.	Prod.
Jurisdiction	2		2							
Overtime		2	1	3				10		
Vacations			1							
Grievance Procedure				1						
Transfers	—	—	1	—	—	—	—	—	—	—
TOTAL	2	2	5	4	0	0	0	10	0	0
Non Unit	0	0	0	0	0	0	0	0	0	0

Bargaining Unit Check-Off Statistics

	Last Month	This Month
Cancellations	4	3
Additions	18	9
Total Participating	949	955
Total in Unit	1478	1470
% Participating	64.1	64.9

SALARY AND WAGE ADMINISTRATION

Salary Administration

Service planning is being formulated for the next salary review while problem areas recently encountered are fresh in mind. A summary of recommendations will be presented to a joint meeting of Managers of Salary and Wage Administration.

Areas of responsibility are being discussed with Personnel Accounting. In this regard, a broader approach is being investigated in an attempt to combine files and eliminate double record keeping between Salary Administration and Personnel Accounting. Further, it is felt that certain of our routine numerical reports may reasonably be expected to originate within Personnel Accounting, and thus allow more thorough analysis, investigation, and comparisons of salary actions which is essential to effective salary administration. This is in keeping with the recommendations of B. A. Case and F. E. Stehlik, and has the endorsement of John Giles, Traveling Auditor.

Reconciliation of positions with the representative of the Flight Propulsion Laboratory, A.G.T., was accomplished quite smoothly. One of the more important accomplishments of this meeting was the reconciliation of certain positions within Employee Relations and Finance.

CHANGES OF STATUS OF PERSONNEL	
Transfers into Dept.	2
Transfers out	0
Location changes	3
Suffix Changes	6
FLSA Changes	2
Reassignments	10
Total	23

CHANGE IN SALARY OF PERSONNEL	
Promotional Increases	5
Salary Review Increases	52
Interim Merit Increases	0
Salary Adjustments	0
Total	57

Wage Administration

The approval of a new secretarial plan by AEC made it necessary for the Specialist, Wage Administration to recommend a method and procedure in appraising the secretarial jobs meeting the requirements for consideration of merit increases. Under the provisions of the secretarial approval, all secretaries were retitled, effective January 28, 1957. The date of April 1, 1957 has been set as the effective date of merit increases for those secretaries qualifying. This date was necessary because of the difference in time requirements to complete the necessary appraisals.

The Instrument Development Operation, Research and Engineering Operation, has requested the establishment of three new classifications to cover semi-skilled employees needed to implement the work now being performed by exempt engineers. It is evident that HAPO is facing the problem that has been recognized by other Companies, in that there is a place for higher graded non-exempt semi-technical work than is presently included in our Wage Plan.

[redacted]

CHANGES OF STATUS OF PERSONNEL

Transfers between Depts.	10
Transfers within Dept.	15
Location Changes	0
Reclassifications	26
Retitles	63
Total	114

CHANGE IN SALARY OF PERSONNEL

Automatic Increases	111
Reclassifications	42
Merit Increases	0
Total	153

FIRE PROTECTION

Organization and Personnel

	Exempt	Non-Exempt
Employees - beginning of month	11	41
Employees - end of month	11	41

Fire Responses

Construction Engineering	1	Loss	0
Relations & Utilities	1	Loss	$10
Private Property	1	Loss	$50

Description of Fires

Relations & Utilities, Transportation & Maintenance, Bus & Rail, Riverland Roundhouse - 10:58 a.m., March 14, 1957. Short circuit in heater caused wiring to ignite. Loss $10.

Construction Engineering, Construction Operations, 100 Area Field Construction, Minor Construction Instrument Shop - 12:48 p.m., March 20, 1957. Too much oil in fire pot of stove caused overheating. No damage.

Private Property, old ice house, White Bluffs - 7:15 p.m., March 26, 1957. Sparks from cutting torch ignited salvaged material. Damage $50.

Drills Held During March

Outside Drills	43
Inside Drills.	40
Feet of Ladders Used on Drills	275
Feet of Hose Used on Drills.	2,350 of 1½" & 5,200 of 2½".

Meetings

Type of Meeting	No. of Meetings	No. Attending
Round Table	2	22
Security	4	42
Safety	8	83

General

Chief Hirst visited the Idaho Operation to witness burning experiments. The main experiments were postponed but a complete survey of their Fire Department Operation was made.

The Fire Protection Operation assisted 105-H by supplying a pumper for high pressure pumping, held a chemox mask demonstration for 25 people of the power group in 1704-D, and assisted in a fire demonstration for 12 men of 105-C Processing.

[redacted]

Fire Extinguisher Activities

Inspected	773
Installed	6
Seals broken	25
Serviced	182
Weighed	103

Hand Lines Inspected	23
Hose Boxes Inspected	10
Gas Masks Serviced	1
Gas Masks Inspected	14

HEALTH & SAFETY

Personnel

Employees: Exempt - 4. Non-exempt - 1.

Accident Statistics

	March 1957	1957 to date.
Disabling Injuries	0	0
Frequency	0	0
Severity	0	0
Medical Treatment Injuries	100	281
Frequency	2.53	2.10
Accumulated hours of exposure since last Disabling Injury (10-17-56)	2,234,600	

Fire Statistics

Fires	0	1
Loss	0	0

Security Violations

Research & Engineering	0	4
Facilities Engineering	2	3
K Operations	0	1
B Operations	1	1
H Operations	1	1
Total	4	10

IPD employees became eligible for the Central Safety Council Award Plan on March 17, 1957, by operating 150 consecutive days without a disabling injury. Gifts are being individually selected and will be distributed very shortly.

Supervisory Safety Conferences were inaugurated in March. These involve a 3-hour course in accident prevention orientation and philosophy.

On 3-31-57 a rupture occurred in a heater section in one of the loop circuits in the K operations. Preliminary investigation reveals the failure of a safety device to operate, and in maintaining recognized temperature limitations. No personnel were exposed at the time of this incident.

E F Fitzmaurice
MANAGER
EMPLOYEE RELATIONS

[redacted]

[redacted]

FINANCIAL OPERATION
MONTHLY RECORD REPORT
MARCH, 1957

Administrative Planning

The total of eleven scheduled but outstanding OPGs remained the same as in previous months, with but little progress evident from responsible issuers. OPG 6.2, Policy On Management of Landlord And Other Government Property, was revised to clarify assignment and Landlord relations. No changes were made in property assignment. Fifteen Organization Announcement OPGs were published.

Two new but not previously scheduled Advices were issued with titles as follows: Advice 1.2.16, Vacancies and Transfers - Maintenance Bargaining Unit Employees; and Advice 5.3.7, Scheduling Movement of SS Materials and Certain Essential Materials Between IPD and FPD. Minor revisions were made to five previously published Advices. There was no change reported on the status of the 28 scheduled, but as yet incomplete, Advices not yet initially published.

The Authority Delegation System, Advice 8.1.1 Delegation of Routine Authorities by Position and its ramifications, was tested by Internal Audit and found to be functioning satisfactorily with no violation of the contract evident and delegation made to suitably low levels. Several minor revisions were proposed and are under investigation.

The review of OPGs being held in connection with the PBM Course has obviated the necessity for review conferences at this time. The Advice Review System is progressing satisfactorily.

Level #3 Managers were advised to initiate planning for photographs and articles to be included in the HAPO Annual Report for calendar year 1957. Advance planning at the HAPO level is being urged.

General Accounting

The following IPD advices were reviewed, and found satisfactory.

3.3.1	Travel, Living and Moving Expenses
3.3.3	Entertainment Expenses
4.2.1	Reporting Inventions and Discoveries
4.2.2	Completing the Employee Patent and Confidential Agreement Information
5.4.3	Off-Plant Trips Via Government Automobile

Consultant Agreement CA-160 with A. Hollander of Los Angeles, California and Requirement Contract RO-41 with Irving M. Sabin Company, Incorporated and RO-42 Diamond Alkali Company, for essential material, were received and reviewed.

To expedite preparation of journal entries and to reduce the number of entries written, 27 standard journal entries were issued this month.

Responsibility accounting type operating reports for Facilities Engineering Operation were issued for February. This marks the first time costs have been broken for Facilities Engineering Operation between direct costs, services and assessments.

General and administrative net costs for February totaled $801,200 with Department-General accounting for $575,748, Financial $94,427 and Employee Relations $131,025. The G & A net costs were distributed to Production Cost $780,422 and Research and Development $22,080; with an over-liquidation of $1,302.

The Facilities Engineering Operating Budget for FY 1958 was completed for consolidation with the department budget. Additional work of breaking the budget down by fourth and fifth level components is still in process. The G & A FY 1958 budget was prepared and submitted for consolidation with the department budget.

The Equipment budgets for FY 1958 of $2,000,000 and FY 1959 of $2,300,000 were transmitted to Contract Administration. The Plant Acquisition and Construction Budget for FY 1959 budget calls for $24,130,000 which is divided into five functional programs: (1) reduction of costs, (2) maintaining continuity of operation and safety, (3) increasing production, (4) reduce personnel exposure and (5) new programs.

Spare Parts Inventory forecast for FY 1958 and FY 1959 was transmitted to Contract Administration for inclusion in the HAPO Operating Expense budget. The estimated cost of spare parts on hand on the following dates are:

June 30, 1957	$1 800 000
June 30, 1958	1 995 000
June 30, 1959	2 155 000

Increases in the spare equipment inventory during the next two years are due to: (1) increased quantities and types of equipment installed in IPD plants, (2) aging of the old reactor plants which requires more frequent replacement of parts, thus necessitating stocking of items which were formerly obtained through direct purchase, and (3) increase in power levels resulting in greater wear on existing equipment.

Seven (7) appropriation requests totaling $78,435 were processed in March. The same number of AR's were processed in February, but totaled only $20,990. Two AR's, Process Tube Mock-Ups for the Craft Training Programs and Underwater Manipulators, accounted for approximately $50,000 of the total in March.

The reconciliation of property custodian verifications of movable property is approximately 65% complete. All custodians, with the exception of one, have submitted results of their findings. Numerous items currently being reconciled are found to be on other HAPO records, are included in IPD installed records or have been heretofore carried on the books as Uncatalogued Property.

The records of movable property have been reconciled to IBM and are now in agreement. IBM has supplied us with a list of items in subsidiary account order and in property custodian order.

[redacted]

[redacted]

Unitization of projects is current, however, the issuance of specific reports has been temporarily held up as a result of not having financial closing notices. Portions of Project CG-558 cannot be completed until revisions have been made in the quantities of equipment to be retired from the original scoping of the project. Meetings have been held with property custodians regarding removal and disposal of property retired in connection with CG-558.

Project Cost and Budgets

Operating Budgets for Irradiation Processing Department were completed, reviewed with Plant Managers and the Department General Manager and submitted to Contract Administration for consolidation.

Two reports comparing elements of Maintenance components costs by plants have been established for the use of Maintenance Operation managers in controlling their costs.

The annual physical inventory of coal and fuel oil proceeded as scheduled during the last week of March. The inventory was planned and observed by Product Cost and Budget personnel.

The first of a series of four information meetings for all H Reactor exempt personnel was conducted to acquaint them with methods of accumulating costs, interpretation of cost statements and proper coding of original documents.

A conference was held with Hanford Operations Office and Washington, D.C. AEC personnel to discuss common problems and the AEC Product Cost report.

Personnel Accounting

Irradiation Processing Department's share of the Company cost of the Stock Bonus Plan in 1956 is $21,502.13. This cost is arrived at after giving credit for shares forfeited through withdrawals from the Plan. This is slightly higher than the predicted cost of $20,950 (accrued through Continuity of Service Account).

Approval was received from the Atomic Energy Commission to pay shift differential to exempt employees at 10% of the earnings while on shift. This payment will be retroactive to February 1, 1957.

The first session discussing the preferred method of completing weekly time cards was held in "F" Area on April 10. Attendance was considerably less than what was anticipated. Sessions are scheduled for successive weeks until all areas have been covered.

Auditing

The routine review of material passes for proper documentation to establish accountability for material removed from the plants was transferred to General Accounting Operation.

An audit memorandum was issued covering the review of the records supporting the safety award for which the department qualified on March 16, 1957.

Observations and tests were made of the inventories of essential materials taken at the end of March.

Procedures

A report was issued to management relative to the study of work authorizations. The principal recommendation concerned the use of work requests, where possible, instead of work orders, in order to speed up paper flow and reduce data processing costs.

Representatives of General Accounting, Personnel Accounting and Product Cost and Budgets met with Procedures personnel and the Manager - Finance to discuss problems of office automation.

Responses to a letter mailed to area management and supervision indicate divided opinions as to the advisability of establishing area stationery stores. However, with the location of dormitories making more office space available, a stationery store will be established in 100-H Area. The uses made of this store should indicate the advisability of establishing stores in other areas.

A review is being made with personnel of Plant Accounting and Standards Engineering to determine the feasibility of using productive maintenance cards in making physical inventories of certain items of equipment.

P W Lee

Manager - Finance
IRRADIATION PROCESSING DEPARTMENT

PD Lee:nj

RELEASED

END

DATE
FILMED
11/13/92