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MONTHLY RECORD REPORT
IRRADIATION PROCESSING DEPARTMENT

SEPTEMBER, 1959

73283

Compiled By
IPD Personnel

October 22, 1959

RICHLAND, WASHINGTON

Work performed under Contract No. 2-31-109-ENG-52 between the Atomic Energy Commission and General Electric Company

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IRRADIATION PROCESSING DEPARTMENT
MONTHLY RECORD REPORT
SEPTEMBER, 1959

SUMMARY

RESEARCH AND ENGINEERING OPERATION

The eight columns of depleted uranium were discharged following a failure due to a weld leak on September 18, which constituted an evaluation point for comparison of this material to the previous depleted test.

Although no hot-spot flow patterns were observed on the bumper fuel elements discharged last month, the test was inconclusive since only one hot-spot pattern was observed on the control elements instead of seven expected.

Enriched cluster elements were discharged from KE and KW Reactors at 2840 and 3600 MWD/T, respectively, for failure testing in the ETR. An apparent failure required the discharging of enriched tube-tube elements from KER Loop No. 3 after only 300 MWD/T exposure.

Preliminary results from the newly developed IBM-709 Fuel Design and Accountability programs have progressed to the point that preliminary runs have been made. Results to date have been very good.

Zircaloy extrusions by Harvey Aluminum Company for both C Reactor and NPR tube contracts examined in September were found to be of excellent quality.

The fuel element failure limit controlled power levels at all but D Reactor which was controlled by bulk outlet temperature limit.

Initial use of the Traveling Wire Flux Monitor installed in KW Reactor was satisfactory.

The operational tests of the DR Gas Loop were essentially completed and the last fuel body submitted for analysis was approved for the first test run.

MANUFACTURING OPERATION

Reactor input production was 14.1 per cent above forecast, 6.0 per cent above at the six old reactors and 26.8 per cent above at the K's. Forecast was exceeded due to high time operated efficiency, particularly at the K's, and improved production efficiency.

There was no increase in the maximum established power level. (Combined total for all reactors.) The power level at KW was increased 60 megawatts above the previous maximum.

Three ruptures, two I and E regular metal and one I and E depleted metal, were removed from the reactors. The regular metal ruptures were at DR and KE, the depleted rupture at C Reactor.

Significant items of equipment experience were:

1. Thirty-seven process tubes were installed; 21 at F, 14 at H, one at DR and one at KE Reactor.

2. Five process tube water leaks were corrected; 3 at F, 1 at DR and 1 at KE.

3. The plugging of crossheader and orifice screens with rubber particles was experienced at B Reactor when a section of the neoprene curtain seal dropped into No. 4 storage tank at 190 Building.

4. New design impellers were installed in pumps Nos. 2 and 3 at 190-C.

5. Inspection of the 1904 outfall structures at F Reactor showed deep cracks in the walls of the structure and open joints where the outfall lines join the structure.

6. Two rear face crossheader expansion joint failures occurred at KW Reactor.

FACILITIES ENGINEERING OPERATION

The downcomer model test program at Washington State University in support of the proposed 105-DR downcomer modifications is near completion.

Studies of the adequacy of existing reactor process water backup systems indicate earthquake vulnerability to be a major factor.

Arrangements have been made for the fabrication of a new prototype high lift pump impeller for the CG-775, 190-KE Pump Testing Program. Approval by HOO-AEC of an increase in design process water flow from 175,000 to 188,000 gpm was received. Studies of methods of reducing the project cost are under way.

Detail design for Phases I and II of CGI-791 has been completed. Preparation of Phase III scope and detail design is currently under way. Substantial progress has been made in equipment installation for the Halogen Collector Test program.

Detail design for CGI-839 is proceeding slightly behind schedule. The procurement specifications for the loop circulating pumps has been completed and issued. HOO-AEC is still conducting Architect-Engineer negotiation for the preparation of the Hot Maintenance Shop detail design.

One-hundred-fifty gunbarrel bellows at 105-C were successfully sealed with silicone foam.

An examination of the experimental sub-critical neutron monitor showed no signs of wear or corrosion.

Continued operation of the Daystrom prototype flow monitor shows excellent repeatability and stability characteristics.

A report has been issued which recommends immediate replacement of rear face pigtails at 105-F.

The guide for maintenance work on code piping has been completed and will be distributed as soon as it has been reproduced.

Engineered methods and equipment for improving rear face setup and buttonup operations were tested in 105-DR and proved the desirability of making similar installations in all areas.

The engineering effort supporting power coordination was continued with a reduction in demand made possible by use of steam turbines for safety purposes. A complete survey of storage batteries in IPD has been completed and rehabilitation work initiated. The control of the Columbia river temperature was concluded September 28 after a highly successful period.

The remodeling of all area drafting rooms has been completed. This brings the working conditions of all IPD draftsmen up to standard with other HAPO drafting installations.

After six months operation a first stage impeller of the latest design (PW 1417-2) in a 190 process pump showed only minor etching from cavitation.

All reactors have manually operable Fog Spray Systems (Project CGI-791 - Reactor Confinement).

Bid packages for the filter buildings construction were distributed on September 29. Bid opening is scheduled for October 28.

RELATIONS PRACTICES OPERATION

Experienced BS/MS recruitment increased considerably while PhD recruitment remained at the normal seasonal level. Exempt transfers and terminations within IPD are as follows: six exempt transfers into the Department, five from other HAPO components, and one from the Silicone Products Department - Waterford, New York; two transfers out of the Department (one within HAPO and one to APED-San Jose); one non-exempt employee was upgraded to exempt status; one exempt employee was reactivated and five summer employees terminated.

Mass communication activities included the publication of nine Management News Bulletins, one Round Table Guide, three IPD Employee Headliners, three priority messages, eleven HAPO OPG's and one IPD OPG during September.

Salary Administration activities, aside from routine items, included preparation of salary administration data on all exempt employees of the Department for inclusion in the annual Company compensation study as of October 1, 1959, to determine Company average position level, percentage of position rate, and similar bench marks.

Four IPD exempt employees were granted tuition refunds for completion of work related courses completed during the summer quarter 1958-59 at the University of Washington Center for Graduate Study. During September, IPD paid a total of $170 in suggestion awards to 20 suggesters for a total of 19 new suggestions.

There were no disabling injuries reported in September. This extends our injury-free days to 198 during which time we have accumulated 2,350,000 hours of exposure. There was a drastic reduction in medical treatment injuries. Two security

violations, one in Research and Engineering and one in F Area, were reported, the first since July making a total of 22 for the year; three less than in 1958. A study of better methods of handling, fitting and care of plano-type glasses is in progress. This is being conducted in all 100 Areas in conjunction with First Aid Stations who will handle this equipment. The purpose is to encourage more employees to protect their eyes where they are subject to the hazards of our type of operation.

FINANCIAL OPERATION

Starting September 28, 1959, vendor inspection services performed by General Electric will be charged directly to projects affected, rather than General Construction Indirect. This change will result in a reduction of the percentage liquidation rate of General Construction Indirect from 5 per cent to 3.5 per cent effective same date.

A physical inventory of precious metals was taken on September 30, 1959. No significant discrepancies were noted.

Detailed costs for FY 1960 were examined to determine how possible reductions could be accomplished to meet the AEC Financial Plan.

The essential material procedure for taking physical inventories was revised to change the schedule to the 25th day of each month. This will aid operating people in scheduling their inventories and will result in earlier reporting.

A schedule of UO_3 credits compared to amounts paid for machined slugs for the last three years was prepared.

NEW PRODUCTION REACTOR PROJECT OPERATION

Construction work at the N-Site has consisted of work on the access highway, 12-inch water line, and 13.8 kv line. The base course for the highway has been completed and the leveling course is now being placed. Approximately 2,200 lineal feet of 12-inch steel pipe for the water line has been installed and tested. This line has been tied into the 42-inch export line. Post holes for the 13.8 kv line from D Area have been dug.

The steel strike is still affecting the Allegheny-Ludlum Steel Corporation contract on the zirconium tubes. Chase Brass and Copper Company has received major equipment required for fabrication of the tubes and should proceed with the order per schedule. Harvey Aluminum Company has experienced some difficulty in drawing tubes to finish size. Difficulties are not serious and should be corrected with modification of their process.

Initial tests were run to obtain basic information regarding two-phase flow from a break in a high pressure, high temperature water line, needed to support calculation of NPR primary pipe rupture consequences.

Weighted evaluation of over-all reactor plant design indicates that progress has maintained pace with schedule. Development and test support is the principal program element indicated as being behind schedule. Final approval of detail design drawings is also behind, but considerable improvement is being made.

On the heat dissipation system, detail design work has been slowed through lack of approved scope design. Therefore, the project representatives group convened at the A-E's offices during the past month in order to process critical scope material with a minimum of delay.

Agreement was reached with the A-E regarding items to be included in the negotiation of the final main heat exchanger design. Investigation of alternate larger area designs to permit higher secondary steam pressures during plutonium only operation was specifically included.

IRRADIATION PROCESSING DEPARTMENT
MONTHLY REPORT OF INVENTIONS OR DISCOVERIES

SEPTEMBER, 1959

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, notebooks, records, if any, kept in the course of their work have been examined for possible inventions or discoveries.

Name	Title
E. Hollister	A Roller Type Process Tube Flanging Tool
E. Hollister	A Remote Controlled Drive for Automatic Sampling Devices
E. Hollister	A Pneumatic Process Tube Inserter
E. Hollister	A Cartridge Type Process Flanging Tool
R. B. Willson and C. E. Frantz	Automatic Clutch

General Manager
IRRADIATION PROCESSING DEPARTMENT

RESEARCH AND ENGINEERING OPERATION

SEPTEMBER 1959

VISITORS AND BUSINESS TRIPS

R. H. Simon of General Atomic, Division of General Dynamics, San Diego, Calif., visited HAPO to inspect the DR Gas Loop, 9/16/59.

P. N. Burkard, H. Suter, J. Schneider, W. George, L. Wagner and D. H. Tuel of Wyandotte Chemicals, Wyandotte, Michigan, visited HAPO to discuss metal cleaning and decontamination, 9/21-23/59.

B. O. Grable of Westinghouse Electric Corp., MTR Site Operation, Idaho Falls, Idaho, visited HAPO to observe a pump installation and test, 9/21-25/59.

R. A. Williamson, K. McBean, and R. Lowe of Holmes and Narver Co., Los Angeles, Calif., visited HAPO to consult on earthquake problems, 9/23-24/59.

W. R. Conley reviewed design material at Burns & Roe Co., New York, N.Y., 9/7-25/59.

D. H. Curtiss visited Harvey Aluminum Co., Torrence, Calif., for zirconium tube consultation, 9/15-17/59.

O. H. Greager participated in NPR presentations to the AEC in Washington, D.C., and inspected the Dresden Reactor near Morris, Illinois, 9/19-22/59.

S. S. Jones visited Albrook Hydraulic Laboratory, Washington State University, Pullman, Wn., to discuss technical information, 9/23-24/59.

O. E. Adams consulted with General Engineering Laboratory, Schenectady, N.Y., concerning the testing program being performed for IPD, 9/25-29/59.

W. S. Nechodom visited Epsco, Inc., Philadelphia, Pa., Duquesne Power & Light Co., Pittsburg, Pa. and Battelle Memorial Institute, Columbus, O., for consultations on reactor operating problems, 9/26-10/3/59.

W. A. Oldham visited General Electric Co., APED, Pleasanton, Calif., to witness decontamination of a test reactor, 9/30-10/2/59.

ORGANIZATION AND PERSONNEL

	Permanent		*Rotational	
	Aug.	Sept.	Aug.	Sept.
Management & Administration	5	5	-	-
Process & Reactor Development	45	44	8	4
Process Technology	35	34	5	4
Operational Physics	19	19	6	7
Testing	69	69	2	2
	173	171	21	17

* Includes Summer Personnel (September End - 0)

Process & Reactor Development: F. W. Van Wormer, Senior Engineer, transferred to Testing as Supervisor, Irradiation Testing, 9/1/59. J. C. Peden, Engineer II, transferred to HLO, 9/1/59. R. H. Shoemaker and F. D. Robbins, Senior Engineers, Summer Program additions, resigned, 9/21/59 and 9/22/59, respectively. Virginia D. Bischoff, Secretary, transferred from Facilities Engineering, IPD, 9/29/59. M. D. Hannon, Engineering Assistant, Summer Program Addition, resigned, 9/28/59.

Process Technology: R. W. Hooper, Engineer I, transferred to B-C Reactor Oper., IPD, 9/1/59. S. A. Shipley, rotational Technical Graduate, Summer Program addition, resigned, 9/18/59.

Operational Physics: J. C. Bryner, Engineer II, Summer Program addition, resigned, 9/18/59.

Testing: F. W. Van Wormer, Senior Engineer, transferred from Process & Reactor Development as Supervisor, Irradiation Testing, 9/1/59. E. L. Burley, Engineer I, transferred to APED, San Jose, 9/25/59.

PROCESS AND REACTOR DEVELOPMENT SUBSECTION

Reactor Fuels

Present Reactor Technology

Depleted Uranium Failure

A depleted uranium fuel element failed on September 18 in one of the eight columns of depleted fuel charged under PT-IP-132-AC. The failed piece appeared similar to the previous depleted failures in which water entry through the weld resulted in extensive splitting of the core from oxide formation.

The remaining seven columns were also discharged as one failure constituted an evaluation point for comparison of this material to the previous depleted test, and fuel warp appeared troublesome.

Bumper Fuel Testing

It has been concluded that the demonstration test of bumper fuel was inconclusive and a more stringent test should be charged. No hot-spot flow patterns were observed on the bumper test elements. On the presumption that the control elements would have a 2% incidence rate, this appeared to be a definitive result. Only one hot-spot pattern, however, was found in the ten control columns (about 0.3%), which were examined last.

E-N Fuel Testing

The "blanket" portion of PT-IP-255-A (5) including controls were charged at 105-H on 9-23-59. This test is designed to permit determination of individual column conversion ratios, tritium production, fuel performance, and physics parameters. The fuel for the "striped" portion of the test is being prepared.

Advanced Reactor Fuels

Irradiation Testing

On September 7, 1959, three (3) 1.47% enriched tube-and-tube elements were charged into KER Loop 3, under PT-IP-250-A, Supplement B, to an exposure of 5000 MWD/T. The charge also included a thermocouple train for estimating any thermal-hydraulic unbalance in the three annuli. A failure apparently occurred in this charge on 9-30-59. No information is available regarding this occurrence at this time.

The two (2) enriched cluster elements irradiated in the 3674 KE front-to-rear test hole under PT-IP-237-A for subsequent control failure testing in the ETR were discharged September 7, 1959 at an exposure in excess of 2000 MWD/T.

Three tubes of aluminum capsules containing enriched uranium samples in NaK were charged in D Reactor on September 18, 1959 under PT-IP-227-A. This test is intended to measure the effect of temperature, exposure and cladding thickness on the high temperature swelling of uranium.

Off-Site Contracts

NMI has produced an additional [illegible] feet of KER-size, natural, unalloyed tube-tube material for use by HLO in irradiation testing of the upset formed-projection welded closure concept.

NMI is preparing special brazing alloys to be used in their study of the feasibility of using a braze alloy for bonding caps by induction heating following fusion welding of the cap to the cladding.

IBM Fuel Design Program

The IBM Fuel Design Program has progressed to the point where pressure drop effects due to slug misalignment, thermal expansion, and fuel swelling are about to be included. In addition, a program for analyzing conditions at each point in the column is being developed. Among other results, the tendency for flux skewing will be calculated.

Preliminary analysis indicates that the 709 program predicts a coolant temperature unbalance in KER tube-and-tube test in KER Loop 3 in close agreement with measured values.

Coolant Channel	709 Prediction	Test Data
Outer	269 C	264C - 275C
Middle	258	255 - 260
Inner	243	244 - 244

Reactor Physics

Present Reactor Technology

Isotope Buildup Calculation

With the completion of the new IBM-709 Accountability program, particular cases have been computed and results compared with the earlier IBM 702 version. The new program gives very good agreement with the earlier 702 program for Pu buildup and U^{235} burnout at exposures under 400 MWD/T ($\leq .5\%$ difference) except for K plants. At higher exposures the new program predicts higher Pu production and U^{235} burnout at the older reactors; the K plant results show less Pu but higher 235 burnout up to 800 MWD/T than previously. The manner in which the K plant results differ is such to improve IPD-CPD product differences.

In Core Flux Monitor

The Traveling Wire Flux Monitor at KW Reactor has been successfully demonstrated in prototype operation. Currently operational control is too complicated. Mechanical development personnel recognize the problem area and will simplify the operation.

Ion chamber development programs are continuing at a slow pace. The vendors Anton Electronics and Victoreen are plagued with delays and fabrication technique problems.

Test No.	Type Metal	Tubes	Reactor	Goal Exposure	Current Exposure	Remarks
IP-56-A	Low Hydrogen Dingot U Elements	87	D,DR,F,C	Variable		Semi-production scale testing of low hydrogen dingot uranium fuel, solid.
IP-84-A	Projection	13	B	900 MWD/T		Preliminary evaluation of self-supported fuel elements. Low exposure columns discharged at 400, 600 and 800 MWD/T.
IP-95-A	Lead Dip, 1.445"	9	D	Normal Goal		Provides for preliminary testing of I & E elements in D Reactor and for long term corrosion monitoring.
IP-168-A	1.460" O.D. natural I&E	5	C	Variable 800		Long term corrosion monitoring & refinement of operating limits.
IP-171-A	Solid M388 & C64-F	4	B,DR,F	Variable 500	520	Provide for evaluation of alternate aluminum component vendors. Control columns are only ones carried special. Rest are lot charged.
	I&E M-388 & C-64-F	6	D&H	Variable 800		
IP-178-A	1.474" O.C. I&E Nat.	6	KE,KW	Variable 800		Provides for irradiation testing of KIII elements, water mixers and long term tube corrosion monitoring.
IP-216-A	Normal Prod. Nat. OII,KII & KIII fuel elements	28	All	Normal Variable Goal		Provides for monitoring the performance of a sample of all Natural Uranium Lots to assist in development of a Quality Index for Production use. Test is continuous.
IP-226-A	Zr-2 jacketed 1.6% enriched 7-rod cluster elements	2	KE	5000	Loop 2-1700MWD/T " 1-400 MWD/T	Charged in KER Loop 2 on May 19, 1959 and KER Loop 1 on August 24, 1959.

Test No.	Type Metal	Tubes	Reactor	Goal Exposure	Current Exposure	Remarks
IP-227-A	Enriched uranium samples in aluminum capsules	6 3-test 3-control	D	1500	240,270 and 320 MWD/T on three test columns	Test charged in 105-D on September 18, 1959.
IP-231-A	Depleted CII elements	0	C	Nov. 1959	10 months	Authorizes high exposure irradiation of eight columns of depleted uranium to measure effectiveness of process changes made after IP-132-AC failures. First discharge 9-18-59 after one failure.
IP-237-A	1.6% Enr.Zr-2 jacketed 7-rod cluster elements	2	KE,KW	Elements in KE discharged at 2840 MWD/T and in KW at 3600 MWD/T.		Charged April 24, 1959 in KW and May 9, 1959 in KE to obtain exposure before failure testing in the ETR. Elements in KE discharged Sept. 19, 1959, and in KW discharged Sept. 30, 1959.
IP-243-A	Fuel elements clad in components extruded from cost blanks	0	H	variable OIIE goal		Authorizes charging of six monitor columns and five tons per quarter of OIIIE fuel clad in components impacted from cost rather than wrought blanks for rupture comparison with the normal production OIIE. Columns discharged at goal, awaiting examination.
IP-250-A Supp. B	Three enriched Zr-2 jacketed tube-and-tube elements	1	KE	500	Discharged at 310 MWD/T with failure	Elements charged in 3565 KE,KER Loop 3 on Sept. 7, 1959, and discharged Sept. 30, 1959 with failure.
IP-259-A	CIIN	4	C	Variable CIIN	100 MWD/T	Authorizes temperature distribution measurement in badly corroded C process tubes.

High Speed Scanning Project CGI-802

A technical liaison meeting is in progress this week, September 28, 29, and 30 at Epsco, Inc. discussing and acquainting Epsco engineering personnel with the high speed scanner requirements and functional criteria.

Speed of Control Calculations

Updated speed of control calculations on the analog computer were completed for the C and K reactors during the month. The calculations were designed primarily to critically assess the degree of conservatism in the results. Therefore cases were run as a function of rod strength, rod speed, metal coefficient, water worth and delayed vs. instantaneous pressure drop. I & E geometry was included for the heat transfer portion of the calculation and the delayed fission and fission product heating was included.

The limit curves for C & K reactors indicate no problems from speed of control until power levels are significantly higher than now. The K reactors are furthest within limits. The results of these calculations will be documented and also used for bases for Process Standards.

Neutron Thermalization

A Monte Carlo method for the study of neutron thermalization in a heterogeneus lattice has been developed during the past month. The problem is presently being programmed on the IBM-709 and will give as output the neutron temperature at various radial distances from the lattice cell center, η, f and L^2.

Advanced Reactor Physics

Analytical Studies

A Monte-Carlo method of calculating p for heterogeneous water-graphite NPR type lattices was developed during the month and is ready for programming on the IBM-709.

Neutron Temperature Studies

The F_3' (F_3 with up-scattering) has been checked out completely. A test case was used to check out the program, a cell calculation with 500°C graphite, cold water and a 2 cm fuel element, and the results were what one would expect.

Lutetium foils are being prepared for the neutron temperature experiments. It has been decided to raise the flux in the TTR by a factor of 5 to 10 for future temperature measurements.

Buckling Measurement Results

Tube-Tube Geom. (2.5" x 2.0" x 1.66" x 1.1" - all diameters)

L.S.	Coolant	B^2
10 3/8"	Water	-49.4 B

Tube-Rod Geom. (2.5" x 1.6" x 0.5' - all diameters)

L.S.	Coolant	B^2
14 9/16 "	Water	- 1064B
14 9/16 "	Air	+ 66

Reactor Engineering

Existing Reactor Technology

Reactor Hazards

Preliminary design of I & E fuel elements for use in zirconium process tubes have been developed for use in computing the reactivity changes and estimates of the meltdown sequences for use in hazards studies.

Smooth Bore Zircaloy Process Tubes

Harvey Aluminum Company has made two extrusions for the preparation of smooth bore zircaloy process tubes of C-Reactor size. These extrusions were inspected by GE personnel and found to be of excellent quality. Contracts for smooth bore zircaloy process tubes for C-Reactor at Harvey Aluminum Company and Bridgeport Brass Company are slightly behind schedule.

Advanced Reactor Technology

Zirconium Process Tubes - KER

A purchase requisition for eight to ten KER replacement tubes was modified to read six to eight process tubes. At present there are no replacement tubes available for the four re-circulating loops in the KE facility.

NPR Process Tubes

The Harvey Aluminum Company contract for NPR process development is essentially on schedule. Two extrusions for NPR tubes have been examined. They were both excellent in dimension and surface condition.

MTR Graphite Irradiations

Preliminary evaluation of the graphite samples irradiated in the first modified shim rod in the L-48 position indicate that the National Carbon Co. graphite made from needle coke supplied to them by the Continental Oil Co. contracts at about the same rate as CSF graphite. The second test capsule irradiated in the L-48 position containing samples of Great lakes Carbon Corp. graphite made from a proprietary needle coke was discharged from the reactor on September 21. The third test capsule containing samples of Great Lakes Graphite made from needle coke supplied to them by the Continental Oil Co. was charged into the reactor September 21. All four thermocouples and all four heaters are working properly on this third capsule. It is scheduled for discharge November 23.

GETR Graphite Irradiation

The two test capsules installed in the GETR on September 2 have operated successfully through one cycle. The thermocouples showed the temperatures of the graphite samples in the range from 900 to 1500 C. After about two weeks of operation some of the thermocouples started burning out. All of the couples in the capsule with the higher temperatures have failed. It is planned to discharge this capsule the end of October.

Radiological Engineering

Radiation Control Experience

The following table summarizes the first 36 weeks in 1959 radiation exposure experience for the critical IPD classifications:

Classification	Total Dose	No. of Employees	Average dose/employee	Extrapolated Year End Average	No. of Employees Over 3r Extrapolated Exposure
Radiation Monitors	115929 mr	83	1397 mr	2017 mr	2
Processing Operators	285384 mr	253	1128 mr	1629 mr	0
Pipefitters	129521 mr	96	1349 mr	1948 mr	2
Millwrights	92744 mr	79	1174 mr	1695 mr	1

Lapse of Control

The following table summarizes the September Lapses of control experienced in IPD

Lapse of Radiation Control
Distribution by Reactor and Component

	B	C	D	DR	F	H	KE	KW	IPD Totals
Processing			1	3	1	1	1	0	7
Maintenance	0	0	1	0	1	1	2	2	7
Supplemental Crews	0	0	0	0	0	1	0	0	1
Research & Engineering	0	0	0	0	0	0	0	0	0
Facilities Engineering	0	0	0	0	0	0	0	0	0
Central Maintenance	0	0	0	0	0	1	0	0	1
Reactor Areas	0	0	0	0	0	0	0	0	0
Assigned Totals	0	0	2	3	1	2	3	2	13
IPD General									0
HLO				White Bluffs Maintenance Shop					1

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

Effluent Water Data

Average Reactor Effluent Activity Output

	September 1959	August 1959	September 1958
107-B	28,000 uc/sec	29,000 uc/sec.	17,000 uc/sec.
107-C	22,000 "	26,000 "	19,000 "
107-KW	51,000 "	39,000 "	60,000 "
107-KE	36,000 "	57,000 "	38,000 "
107-D	21,000 "	21,000 "	19,000 "
107-DR	15,000 "	13,000 "	12,000 "
107-H	20,000 "	12,000 "	19,000 "
107-F	18,000 "	14,000 "	20,000 "
Total	211,000 "	211,000 "	204,000 "

Reactor Effluent Water

Temperature measurements were made in the hot springs in the vicinity of the 181-B forebay. The maximum temperature was 157 F. A sample of water from one of the hotter springs was submitted for radiochemical analysis. The only identifiable radioisotope which was present was chromium-51.

Addition of chemicals in single-pass tubes at 105-KE supplied from 1706-KER was begun. Evaluation of data is incomplete, but it was apparent that arsenic performed as expected whereas phosphorus did not. The amount of phosphorus-32 which was formed by addition of phosphates was orders of magnitude less than anticipated.

Instrumentation

Air Monitoring

Bids have been received for the continuous air sampler to be purchased for ProjectCGI-865. Three vendors appear to have equipment capable of filling the need.

PROCESS TECHNOLOGY OPERATION

REACTOR POWER LEVEL LIMITATIONS

The limits to all reactor power levels at the end of the report period except at D Reactor were based on fuel element failure control at the goal exposure currently in effect. At D Reactor the bulk outlet temperature limit was the most restricting limit.

WATER TREATMENT

Plant Tests

The test to determine the effects of alum addition to filter effluent flume as a film removing agent has not been completed.

Filter-coal Media

Filter-coal media meeting recently revised specifications has been received, and is being used to replace the normal loss of media.

PROCESS STANDARDS

HW-46000 B, Process Standards - Reactor

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

Process Standard A-010 - "Process Piping"

Inspection requirements for front and rear face fittings were added as an aid to early detection of abnormally leaking fittings and faulty pigtails. Definitions of pigtail failures and other fitting failures were added. Also included were conditions under which operation is permitted when the rear pigtail fails on a tube containing fissionable materials.

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

The Standard was revised to identify and limit gas impurities other than oxygen that enter the reactor, primarily from air leakage. Action to be taken when the nitrogen limit is exceeded was included.

Use of Orsat analyses during operation was limited to times when the more sensitive oxygen analyzer is out of order. The frequency of routine mass spectrographic analyses was not changed. However, the frequency of the special spectrographic analyses, required when oxygen concentration is above 0.05 per cent, was reduced provided the continuous O_2 analyzer is operable.

In addition, information concerning allowable Helium-CO_2 ratios was deleted from the Standard and moved to Standard C-040.

Process Standard C-040 - "Graphite Temperature Limits"

The revision consisted of transferring allowable He-CO_2 ratios and a curve of graphite temperature limits from Standard B-010, as these reactor control matters more appropriately belong in this Standard.

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

The revision eliminated charge make-up specifications for the obsolete C and J slugs. Enriched slug specifications now pertain only to enriched uranium (E) slugs.

HW-46000 D, Process Standards - Reactor

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

Process Standard A-010 - "Process Piping"

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

Process Standard C-040 - "Graphite Temperature Limit"

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

These revisions are identical to those issued for HW-46000 B, above.

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

Since the change to an I & E slug loading, there has been considerable difficulty in raising water pressure high enough prior to startup to reset the #1 Safety Circuit low pressure trip. To eliminate this, the revision permits a new, lower trip setting. This reduction is believed to be the last of several trip pressure changes that have been necessary as the number of I & E charges was increased.

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

A specific value for the Ball 3X low pressure trip pressure setting was incorporated in this revision. This trip is a part of the Ball 3X water pressure decay protection system and was formerly specified by reference to the companion #1 Safety Circuit trip. Because the option of removing the #1 Safety Circuit low pressure trip was authorized by a recent revision to Standard A-040, it was necessary to change the method of specifying the Ball 3X trip setting. The revision also incorporated provisions to ensure that Ball 3X water pressure decay protection is automatically available at all times during operation.

HW-46000 K, Process Standards - Reactor

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

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

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

HW-27155 Rev1 - Process Standards - Water Plant

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

Process Standard 190-B-070 - "Emergency Water Requirements - B, C, D, DR, F and H Water Plants"

The Standard was revised to permit by-passing the riser pressure switches in turbine starting circuits when the turbines are continuously operated at full speed. To permit C Reactor to operate safely at the maximum bulk effluent temperature limit (specified in Process Standard A-021, HW-46000 B) requirements were added to Standard 190-B-070 to control the use of the power-loss relays for process pump motors. (Similar specifications for other reactors were issued previously.)

PROCESS CHANGE AUTHORIZATIONS

Twenty-five Process Change Authorizations were used during the month to permit temporary deviation from Process Standards - Reactor, HW-46000, and two were issued to permit temporary deviation from Process Equipment Standards, HW-41000. These were:

PCA #9-97 - "Poison Column Control Facility Discharge - B, D, DR, F and H Reactors"

This PCA extended the provisions of PCA #9-87, which provided a method of calculating the required difference between bulk outlet water temperature and saturation temperature at the top of the downcomer when less than a full column of poison is to be discharged. The temperature differential is required to prevent effluent system damage in event of a power surge.

PCA #9-98 - "Gas System Filter - KW Reactor"

The gas loss at KW Reactor was about 3000 cubic feet per hour. The leak was thought to be in the filter piping. It was desired to by-pass the gas flow around the filter for about one hour to leak check the piping. The PCA permitted removal of the filter from the gas recirculation system for one hour during reactor operation.

PCA #9-99 - "Horizontal Bowing of Process Tubes - B Reactor"

The B Reactor was two months overdue in taking the horizontal bowing measurements required by Standards. A four month extension was granted by this PCA, allowing time for preparation of new bowing measurement equipment.

PCA #9-100 - "Graphite Thermocouple Stringers - B Reactor"

The B Reactor had not complied with the graphite thermocouple stringer requirement due to failure experience with stringer thermocouples. To

schedule installation of a new design of stringers, an extension of time was granted. An alternate method was specified for monitoring graphite temperature during the interim period.

PCA #9-101 - "Water Leak - DR Reactor"

The condensate collection rate at DR Reactor was slightly above that permitted by Standards. The leak was believed to be in the rear section of the reactor where it would not significantly affect reactor life. Restrictions were specified to permit continued operation until an outage could be efficiently scheduled to repair the leak.

PCA #9-102 - "PCCF Charge Machine - C Elevator Key Interlock - D Reactor"

The key which interlocks the C Elevator with the PCCF charge machine broke off in the charge-machine lock and could not be removed. By-pass of the C-elevator interlock was permitted provided the charge machine was physically removed from the proximity of process tubes each time the elevator was moved.

PCA #9-103 - "Horizontal Rod Modification - D Reactor"

It was desired to increase the number of half-rods at D Reactor to three. Improved control and increased production without decreasing reactor safety is expected as a result of this change. A Design Change authorization to complete this work documented this modification.

PCA #9-104 - "Flux Monitor Range Switch Settings - D Reactor"

PCA #9-105 - "Flux Monitor Range Switch Settings - F Reactor"

Flux monitor amplifier indications at D and F Reactors were slightly lower than the four major divisions on the least sensitive range required by Standards. Because the flux monitor chambers were already in the most active flux zone, it was not possible to increase the reading by repositioning chambers. Use of range switch pegs to prevent accidental switching to a less sensitive range was required by these PCA's.

PCA #9-106 - "C Elevator Photocell Interlock - D-DR Reactors"

The PCA extends PCA #9-35 which required an electrical interlock between charging machine and the C elevator to control elevator movement. The interlock prohibits elevator motion whenever a charge machine is positioned within the tube pattern, and is being used as a temporary substitute for the photocell interlock until development of a more trouble-free device is completed.

PCA #9-107 - "Ball 3X Component Testing and Seismoscope Activation of VSR's at C Reactor"

Failure of components of the Ball 3X recovery system caused a delay in functional tests required by Standards. New parts are being installed, and testing is expected to be completed by November 1. The PCA allowed a delay

in test requirements, and also permitted setting the seismoscope to initiate a VSR scram rather than a Ball 3X drop, until renovation of the recovery system is completed.

PCA #9-108 - "Temperature Monitoring During Shutdown - C Reactor"

Normal process tube temperature monitoring methods cannot be used during thermocouple replacement currently scheduled at C Reactor. Conditions designed to ensure sufficient cooling at reduced flow in the absence of complete temperature monitoring were specified by this PCA for use during the thermocouple replacement.

PCA #9-109 - "Process Tube Temperature Monitoring - C Reactor"

Compensating requirements which would permit C Reactor to operate with more than 100 inoperable thermocouples were specified by this PCA. Plans are to replace all thermocouples during one near-future outage.

PCA #9-110 - "Graphite Thermocouple Stringers - F Reactor"

The F Reactor had not complied with the graphite thermocouple stringer requirement due to failure experience with stringer thermocouples. To schedule installation of a new design of stringers, an extension of time was granted. An alternate method was specified for monitoring graphite temperature during the interim period.

PCA #9-111 - "Graphite Thermocouple Stringers - H Reactor"

Process Standards equire two graphite thermocouple stringers be installed in H Reactor while filler block thermocouples are still operable, to obtain correlation data. Only one stringer has been installed, and since its installation five of the 11 couples have failed. This PCA required two new stringers be installed by November 30. Interim operation with less than two operable stringers was allowed provided a specified alternate method was used for monitoring graphite temperature.

PCA #9-112 - "Flux Monitor Range Switch Settings - H Reactor"

Because of the physical arrangement of two flux monitor chambers, the signal from one flux monitor failed to meet requirements of Standards. A flux monitor circuit change to alleviate the problem has been developed and will soon be installed at H Reactor. Meanwhile, to prevent accidental switching to a less sensitive range, use of range switch pegs is required by the PCA.

PCA #9-113 - "Graphite and Process Tube Distortion Measurements - H Reactor"

The H Reactor was one month overdue in taking the horizontal bowing measurements required by Standards. A one month extension, to permit scheduling this monitoring operation, was granted by the PCA.

PCA #9-114 - "Flow Stoppage to Single Thermal Shield Cooling Tube - H Reactor"

During a routine flow check, thermal shield tube 0170 was found plugged. Adjacent tube powers were about 20% above that allowed by Standards for continued operation. However, since the tube is in the bottom shield and the damage, if any, had already occurred, the PCA permitted continued operation until the next outage when coolant flow will be restored to this tube.

PCA #9-115 - "Process Tube Fitting Leak - DR Reactor"

A leak developed in a process tube thermocouple well at DR Reactor. Continued reactor operation was authorized provided specified power and Panellit low-trip pressure restrictions were applied.

PCA #9-116 - "Graphite Temperature Monitoring - K Reactors"

Removal of graphite thermocouple stringers has become very difficult due to shifting of the graphite moderator. Continued operation with fewer thermocouple stringers than required by Standards was permitted by the PCA, under specified conditions, while new stringer removal techniques are being evaluated.

PCA #9-117 - "Ball 3X Testing - KW Reactor"

The annual test of the Ball 3X system could not be conveniently made because of mechanical problems with the recovery system. A six month delay in test requirements was authorized until repairs could be completed.

PCA #9-118 - "Panellit Gauge Sensing Line Damping - All Reactors"

To prevent over-damping of Panellit gauges, the viscosity of oil added to the sensing line must be carefully controlled. This specification was recently revised in Reactor Process Standards but the revision has not yet appeared in the Process Equipment Standards which are in the process of being re-issued. The PCA modified the damping specification of the Process Equipment Standards to agree with those in the reactor Process Standards.

PCA #9-119 - "Use of Cast Uncanned Tubular Aluminum-Silicon-Cadmium Dummies, B, DR, and F Reactors"

Use of about 2600 unused test poison dummies remaining from Production Test IP-174-1E was permitted. A revised downstream dummy pattern to be used with the test pieces was specified. Test data have shown that reactor safety and life will not be compromised by use of these dummies.

PCA #9-120 - "Shield Cooling Monitoring Requirements - KW Reactor"

Compliance with requirements for annual thermal and biological shield flow checks was overdue at the K Reactors. The PCA recognized the off-Standard condition and scheduled compliance during the forthcoming outage.

PROCESS ASSISTANCE

Auditing

One engineer audited conformance to Process Standards on all Processing Operation's shifts.

Graphics

Graphics services prepared 25 charts, graphs and visual aids for various IPD and HLO components.

RUPTURE EXPERIENCE

Failure Date	Tube No.	Lot No.	Type Metal	Exposure	Type of Failure
9-7-59	0778-KE	KK-090-D	8" I&E Natural	845	Hole
9-14-59	1689-DR	KL-195-D	8" I&E Natural	632	Side-Other
9-18-59	1081-C	CP-801-A	7" I&E Depleted(1)	1151	Unclassified
9-30-59	3565-KE(2)	IP-250-A Supplement B	Tube-in-Tube Enriched(3)		Unknown

(1) PT - IP-218-A
(2) KER Loop #3
(3) 1.6% U-235

Legend:

Hole - Failure on the internal surface of an I & E piece probably caused by water penetration through a weld or other unknown mechanism.

Side-Other - Failure probably caused by corrosion or water penetration of the external can wall or other unknown mechanism.

Unclassified - Failure did not logically fit any one particular type.

Unknown - Failed piece could not be located or had not been examined at the time of writing.

OPERATIONAL PHYSICS OPERATION

PILE PHYSICS ASSISTANCE

One subcritical monitor channel is now in service at each of the B, F, and H reactors. Initial performance of the instruments, installed by project forces with assistance by Instrument Development, has been excellent.

Experience with the improved graphite thermocouple stringers at B reactor demonstrated that full graphite temperature monitoring provides a means for following axial flux distribution changes continuously and for establishing the absolute flux distribution once these couples are properly calibrated by flux traverses. Installation of improved graphite monitoring is scheduled for all reactors in the next few months.

Flattening efficiency as measured by average equilibrium ECT's increased to 76.5 per cent of all reactor tubes in September, representing a continuation of the increasing trend which was resumed in the early part of the summer. Non-equilibrium losses were reduced through limited startup spline usage at the two K reactors and through more aggressive level raising following startup at the B reactor.

SUMMARY OF OPERATING DATA OF PHYSICS INTEREST
FOR THE MONTH OF SEPTEMBER, 1959

	B	C	D	DR	F	H	KE	KW
ECT in Sept. (1)	1420	1640	1500	1500	1460	1600	2485	2510
12 Mo. Avg. ECT	1435	1630	1465	1485	1435	1580	2410	2430
Equil.Scram Time(2)	16-18	12-14*	18-20	25-30	16-24	20-25	18-24*	18-24*
No. of Scrams and	1/1	2/2	0/0	3/3	0/0	0/0	1/1	1/1
Recoveries (3)	1/0	1/1	1/0	1/1	1/0	0/0	2/2**	0/0
No. of Non-Scram Outages (4)	2/0	3/2	1/0	2/0	3/0	1/0	3/3	1/1
Report Period:								
From:	8/26	8/24	8/25	8/24	8/26	8/25	8/24	8/25
To:	9/24	9/24	9/25	9/24	9/24	9/25	9/24	9/23

* Equilibrium scram recoveries are not attempted at the C and K reactors

** 21 hours following one recovery control difficulties forced a shutdown.

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

(2) This is defined as the maximum time available in minutes between scram and the first indication of startup.

(3) The first pair of numbers shows the number of brief outages from which secondary cold startups would be made and the number of successful startups. The second pair shows the number of brief outages from which hot startups would be made and the number of successful recoveries.

Footnotes continued on following page.

Footnotes (Continued)

(4) The first number shows the number of ordinary outages (including those initiated by scrams followed by unsuccessful recovery attempts), and the second shows the number of additional outages to discharge temporary poison.

B REACTOR - W. R. SMIT

Operating continuity was continuous through the report period, except for a five-day interval during which three Panellit scrams caused two outages and delayed one startup. One outage was extended because rubber from a 190-B storage tank float had partially plugged coolant filters and screens. The holding of a number of tubes empty for early replacement and a large fringe discharge reduced reactivity; a lower than normal ECT resulted. Non-equilibrium losses following startup were reduced through use of improved level raise procedures.

The first channel of the subcritical monitor, installed last month, has worked satisfactorily on one hot and three cold startups to date; formulation of procedures to assure optimum use of subcritical monitoring was initiated.

C REACTOR - R. L. FERGUSON

The eight remaining depleted metal charges and supporting enrichment were discharged following a rupture in the depleted charge. The power level was temporarily limited by graphite temperatures following the E-D discharge because it was necessary to gain sufficient rods for efficient control through use of a relatively high CO_2 concentration. This style of operation resulted from reactivity uncertainties associated with the discharge and the necessity to operate with a minimum of reactivity at the first of the operating period so that the rods could absorb long term reactivity gains later in a scheduled month's operating period.

One scheduled outage and two full length unscheduled outages (including the above outage) interrupted operating continuity during the reporting period. In addition, one startup scram was caused by a No. 1 Beckman low trip, and one brief outage was taken at near-equilibrium conditions to discharge an apparent rupture; recovery was successful.

Startup instrument sensitivity of two Beckmans and the galvanometer was well within startup requirements, an improvement over the previous few months.

D REACTOR - W. L. STIEDE

Operation was continuous except for one unscheduled outage which resulted when the Panellit gauge of a PCCF column was improperly jumpered.

Approximately 1,000 gallons of water were removed from the reactor during operation following the outage for a water leak at the end of the previous report period.

Ten splines were charged and six were removed from the reactor; the chopper performed with no difficulty. Fourteen columns of enrichment were added

D REACTOR (Continued)

to maintain a high ECT following a large fringe discharge; future startups will require a few compensating splines in the near-side peripheral enrichment to satisfy total control requirements.

DR REACTOR - D. I. MONNIE

Operating continuity was interrupted by a water leak, a natural I & E rupture which caused another water leak, and five scrams, all but one of which occurred during or shortly following cold startups. Heat distribution has been relatively easy to control partly due to shortening the tube charges to 32 pieces and partly due to lower residual exposure.

A malfunction of the gas analyzer led to a rapid increase in helium concentration on 9-24; the subsequent loss of reactivity caused a temporary period of difficult control.

F REACTOR - G. F. BAILEY

Operation was continuous until the middle of the report period when a series of process tube water leaks caused two outages, and a third outage was necessary because of temperature and pressure indications after the recovery from a Panellit scram.

Recent vertical traverse data showed that upstream graphite annealing nearly stopped over the past year. It will probably be desirable to revert to a downstream rod configuration in spite of its reduced radial control effectiveness.

A large conservative critical prediction error on a cold startup resulted from a misreading of the xenon table, causing a premature wait for a minimum downtime startup. An error of similar magnitude in the non-conservative direction could have been caught and corrected by the now functioning subcritical monitor before power levels in the megawatt region would be attained.

H REACTOR - G. R. GALLAGHER

A scheduled outage at the close of the report period ended 30 days of continuous operation. The high residual exposure resulted in some graphite temperature cycling; a small power reduction was necessary. The large discharge resulted in a low reactivity status which was adequately compensated for by discharging poison from the PCCF.

The zone temperature monitor was made operable, and installation of the rate-of-rise and subcritical monitor instrumentation was initiated.

KE REACTOR - F. C. FRANKLIN

Three full-length unscheduled outages and two non-equilibrium scrams limited operating continuity. However, increased use of splines resulted in above normal ECT and a decrease per startup in non-equilibrium losses equivalent to 4-5 hours at full level.

KE REACTOR (Continued)

Difficulty was encountered in spline removal because pieces of spline hung up in the hopper after being chopped; improvements in the spline eductor system are being made.

A 50-tube temperature monitoring system which effectively advances the indication on 50 selected tubes from the regular monitoring system was completed and used this month for startup control. The 15°C advance warning increases assurance that temperature limits will not be exceeded during startups.

KW REACTOR - A. D. VAUGHN

Only one outage (scheduled) interrupted operation. A new high power level was attained in September through above average flattening efficiency and increased tube power limits.

Flux distributional cycling tendencies because of high power and high residual exposure created minor control problems which were adequately handled by operating procedures including spline insertion and withdrawal.

The traveling wire flux monitor one-tube prototype was installed by Mechanical Development during the month. Data from initial traverses indicate that the system is functioning properly, that it provides a very clear profile of the front-to-rear flux distribution.

PROCESS PHYSICS STUDIES

SAFETY CONTROL STUDIES

HW-61975, Power and Bulk Water Temperature Transients Following Reactivity Accidents, was issued during the month. The document analyzes potential protection of both level and rate-of-rise trips against bulk surges following operating reactivity accidents, and describes effects of top-to-bottom and side-to-side heat unbalance on monitoring capabilities.

A production test is under preparation for initial testing of the subcritical monitor in each area. Its purpose is to assure that response characteristics of the new subcritical systems as installed are within the range of assumptions used in devising standards recommendations.

PILE REACTIVITY STUDIES

Following consultation with various groups the unit chosen for the change-over from inhour to milli k reactivity accounting is the "centi mil", which will be denoted as the "cmk" or 10^{-5} k. Although there will be some problems in acquainting operating people with the new unit and in making the transition, this unit has a more fundamental physical meaning and will be an aid to operator understanding in the future.

CONTROL EFFICIENCY STUDIES

The mechanics of spline usage have improved sufficiently that their control characteristics paid off well during September. Chopping has not been a problem in solid spline removal, and eductor performance has been improving both in procedures and equipment. An order has been placed by Manufacturing for the first time. Previously all solid splines have been from prototype orders placed by Mechanical Development. Therefore, solid splines have been used to only a limited extent for startup control.

Equipment for the six-column prototype of the poison column displacement system to be installed in KW is now on plant and is undergoing out-of-pile tests by Mechanical Development.

Interest in deliberate discharge cycling has been expressed by two of the plants. However, early trial of this method of operation may be precluded by the current short metal supply.

The traveling wire flux monitor system was installed in the KW Reactor by Mechanical Development during the month. Initial traverse results are encouraging with respect to the future usefulness and reliability of this device.

REACTOR FUNDAMENTALS TRAINING

Three types of reactor fundamentals training classes were conducted during the month. A four-session, 14-hour course for Utility Operators was started for the first time formally, the Reactor Specialist classes which had been dismissed for the summer were resumed, and a four-session, eight-hour course for engineers was given.

SHIELDING STUDIES

Production Test IP-285-C was issued to permit measurement of operating temperatures in an uncooled bottom thermal shield cooling tube. The particular tube involved has a flow stoppage; so any damage due to lack of coolant in this tube has probably already taken place. Because of the condition of this tube it is thus possible to get thermal shield heat generation information otherwise not available.

HW-61606, NPR Shield Flux Calculations, was issued during the month. Because of a decimal error in U-235 cell content the gamma heat generation in the reflector was greatly overestimated; the document has been recalled to make this correction.

TESTING OPERATION

IRRADIATION TESTING

KAPL-120 Loop

The empty in-reactor loop was on process water cooling during this period. A replacement No. 3 pump was installed during the reactor outage of September 21. The pump has been tested at 90 per cent of maximum flow and the power consumption was found to be within the range specified by Westinghouse. The installation of lead and steel shielding for the tube external to the reactor was also completed during the outage. Mr. B. O. Grable of WAPD, Idaho Falls, Idaho, observed the installation of the No. 3 pump September 21 through September 24.

Parts for the repair of the existing check valves have arrived. The valves are being repaired under the direction of a Crane Company representative.

A report, HW-61648, "Estimate of Neutron Flux Density for the WAPD 120-8B Irradiation," by J. E. Hanson, dated August 25, 1959, has been issued and copies routed to WAPD personnel at the Bettis Site.

A generalized analytical heat transfer program for the IBM-709 (Fortran) has been prepared and will be used in analyzing irradiation proposals and operating data for the KAPL-120 Loop.

The first spare parts list was forwarded to WAPD on September 11 for comparison with similar lists for other WAPD loops.

DR Gas Loop

Construction work on the loop is complete with the exception of the final cleaning of the emergency storage tanks. This work has been delayed by higher priority work.

Flow transient tests were performed to determine the loop flow behavior upon loss of one compressor in the primary loop. Tests were performed for 450 pounds per hour and 360 pounds per hour and several simulated loop pressure drops. The maximum flow drop noted was approximately 12 per cent of desired flow, with return to full flow in about 30 seconds. This completes the operational testing of the loop with the exception of a check of the flow system response to a signal to switch to the emergency cooling system.

Repairs were completed on one of the two compressors damaged in June. The compressor was installed in the loop and test-run satisfactorily.

The impeller balancing and final adjustment of bearing clearances still remain to be completed on the second compressor.

The neutron leakage from the "A" test hole facility was corrected by modifications of the facility and additional shielding.

Analysis of the second fuel body ($BeO-UO_2$) irradiation proposed, HIR-MGCR-II, was completed and found acceptable for the first test run in the DR Gas Loop.

Development of basic information upon which to base a study of revisions to the loop to permit acceptance of more copious instantaneous fission gas release continued throughout the month.

Dr. R. H. Simon of General Atomic Division of General Dynamics Corporation, San Diego, California, visited the loop and consulted with Irradiation Testing personnel on September 16, 1959. Dr. Simon was interested in obtaining gas loop information that may be pertinent to another loop to be installed in the GETR.

Other Off-Site Irradiation Tests

Atomics International is planning to irradiate a test section of control rod for the Hallam Reactor to determine the effects of irradiation on the thermal properties of the element. It has been concluded that changes in the poison content or control strength of the section cannot be measured in a K Reactor because of long range transients and lack of sensitivity.

HAPO Fuel Element Irradiations

The irradiation of enriched seven-rod cluster fuel elements is essentially complete. As of this date, the fuel elements in test hole 3674 KW are scheduled to be discharged during the current outage and the elements in 3674-KE were discharged on September 7, 1959.

Other Irradiation Tests and Services

1. A total of 16 sets of activation analysis samples were irradiated in the Poison Column Control facilities at D and DR Reactors. These samples are identified as follows:

   a. Ten sets of HAPO-184 samples in support of a Washington-Designated Program assigned to Hanford Laboratories Operation.

   b. Four sets of natural uranium samples (HAPO-218) in support of an investigation of the release of fission products from uranium at high temperatures in oxidizing atmospheres.

   c. Two sets of effluent water residue samples (HAPO-172) in support of a Hanford Laboratories Operation's study of the radioisotopes in effluent water.

2. A total of 19 samples were irradiated in the Quickie Facility (E test hole) in F Reactor. These samples are identified as follows:

   a. Two samples of UO_3 (HAPO-227) to provide a Np^{239} tracer in support of a Hanford Laboratories Operation's chemical separations study.

   b. Seven samples of UO_2 (HAPO-229) in support of a Hanford Laboratories Operation's study of the effects of neutron irradiation and fission events on the structure of thin foils of UO_2.

c. Three samples of natural uranium spheres (HAPO-224) to provide fission products in support of a Hanford Laboratories Operation's study of NPR decontamination methods.

d. One sample of commercially pure titanium to determine the initial activity and decay characteristics of titanium. This material is being considered for use in the NPR safety rods.

e. Three samples of Zircaloy-2 to determine the amount of shielding required for a zirconium tube examination facility.

f. Two capsules containing gold, cobalt and foils in an attempt to standardize flux monitor foils.

g. One cobalt sample to standardize the Quickie Facility ionization chamber with the four-pi ionization chamber.

3. One set of HAPO-184 samples was irradiated in the Pneumatic Facility (3D test hole) at KE Reactor. This is the first successful irradiation carried out in this facility.

4. One snout assembly (HAPO-236) containing flux monitor foils was irradiated in the Snout Facility (4C test hole) at KW Reactor. These foils were irradiated to determine the thermal and fast flux in a K Reactor reflector.

5. The following graphite sample irradiations were carried out in support of a Hanford Laboratories Operation's study of irradiation damage to graphite:

a. Eighteen sample casings were charged and 12 casings discharged from the magazine facility (2B test hole) at KE Reactor.

b. Eighteen sample casings were charged and one casing discharged from the heated magazine facility (2B test hole) at KW Reactor.

c. One sample boat was discharged from the hot graphite facility (2C test hole) at KE Reactor.

6. A capsule designed to measure the creep rate of zirconium while exposed to a neutron flux was charged into the 3A test hole at KW Reactor on September 2, 1959 (HAPO-236). This work is being performed for Hanford Laboratories Operation.

7. The test assembly which was designed to provide controlled graphite sample temperatures in the 200-300 C range was discharged from 1573 DR on September 14, 1959 (HAPO-124). Three of four sets of samples being irradiated operated at a maximum temperature of approximately 130 C. Electrical measurements indicated that the electrical heaters were not functioning properly.

8. The irradiation of a test capsule to determine to what extent the electrical output of thermocouples is affected by the gaseous atmosphere which surrounds the thermocouple bead continues in the 2A test hole at KW Reactor (HAPO-199). The thermocouple beads are currently being irradiated in an atmosphere consisting of a helium, carbon dioxide mixture.

9. Three uranium swelling capsules each containing a thermocouple were charged into DR Reactor on September 18, 1959 (HAPO-221). This test is designed to provide samples of uranium irradiated under different conditions from which measurements can be made to determine the extent of swelling.

10. Two water shut-off during shutdown tests were run at C Reactor (HAPO-198). These tests are designed to provide data for lattice conductance studies and data from which heat generation in reactor process tubes after shutdown can be determined.

Borescoping Activities

The following examinations were made with the borescope in an effort to assist the several Maintenance Operations with problem tubes and channels:

1. Process channel 3655 KE, 1456 KE, 3451 KE and 2168 KE were borescoped to determine the front to rear shift of the graphite stack. With the exception of some gaps between the tube and trunion blocks, the channel appeared to be in good condition.

2. Reactor thermocouple stringer No. 7, KW - A horseshoe-shaped object was observed in the channel and was pushed into a separation between filler blocks.

3. Process channel 4575 F - A detailed inspection of this channel was made to determine if excessive graphite breakage has occurred due to the shifting of the vertical peak toward the front.

A detailed report of the above borescoping work has been distributed to all interested parties.

Vertical Bowing Measurements

A summary of the results of vertical bowing measurements follows. All distances are measured from the front van stone for process tubes or from the reactor face for the traverse holes.

Area	Date	Tube	Distance Run	Results
105-B	8-25-59	4391-B	36'	Down .15" at 9'8" since 12-23-58 Down .14" at 20' since 12-23-58
105-C	9-15-59	4674-C	35'2"	Down .10" at 9'8" since 3-31-59 Down .26" at 20' since 3-31-59
105-D	9-18-59	4674-D	35'	Down .04" at 9'8" since 5-1-59 Down .01" at 21' since 5-1-59
105-F	9-11-59	4676-F	32'	No change at 9'4" since 8-29-58 Down .25" at 20' since 8-29-58
105-F	9-11-59	4675-F	31'	No previous data
105-F	9-17-59	4453-F	36'	No previous data

Area	Date	Tube	Distance Run	Results
105-F	9-17-59	4494-F	33'	Down .13" at 9'8" since 4-11-58 Down .25" at 20' since 4-11-58
105-H	9-22-59	4674-H	37'	Down .10" at 9'4" since 4-8-59 Down .23" at 23' since 4-8-59
105-H	9-22-59	2974-H	37'	No previous data
105-H	9-23-59	1774-H	37'	No previous data
105-H	9-23-59	0274-H	38'	No previous data
105-KE	8-25-59	Z3 channel	43'6"	No previous data

A special set of readings were taken at one-inch intervals for the top center tubes in B, F, and H Reactors.

COOLANT TESTING

During September, 1959, activities of the Coolant Testing Operation included operation of the 1706-KE in-reactor and out-of-reactor equipment, operation of the 1706-KER in-reactor loops, and installation of new equipment and revisions.

A summary record of activities involving each facility follows, including significant items of performance, changes, and improvements:

1706-KE Single-Pass Tubes (PT IP-197-A)

The six central zone single-pass tubes continued operation at the same conditions as last month, namely:

Tube	pH	Water	Dichromate
4355	7.0	Filtered	1 ppm
4456	7.0	Filtered	2 ppm
4557	7.0	Process	--
4863	7.0	Process	--
4963	6.5	Process	--
5063	6.5	Process	--

During the September 30 outage, these tubes were discharged and recharged with KIII-N material as authorized by Supplement B to PT IP-197-A.

1706-KE Mock-Up Tubes

The steam heated mock-up tubes remained shut down during the month following failure of the main steam supply line expansion joint.

Out-of-Reactor Loops

1. ELMO-5 - The loop continued operation at 290 C and pH 10.0 for tests on:

a. Samples of carbon steel and stainless steel which have previously been exposed to various decontamination processes.

b. Surface treatments of carbon steel and stainless steel coupons for decontamination studies.

c. A stress corrosion heat exchanger for determining stress corrosion in a simulated NPR heat exchanger.

2. EIMO-6 - All test material was discharged during the month. The loop pH control medium has been changed from phosphoric to nitric acid, and the loop is presently being conditioned at 300 C and pH 4.5 without test sections charged.

3. EIMO-7 - The loop continued operation at 300 C until September 14, when it was shut down for test section modifications. During this time, tests were completed on:

a. NPR screwed nozzle-to-tube joint running at a constant 575 F. This joint had been leaking for some time before it was removed.

b. A Marmon-Conoseal cap under cycling conditions. This cap was removed due to excessive leakage.

c. Canadian rolled-joint nozzle-to-tube connection. This joint was removed after extensive thermal cycling. No evidences of failure were noted.

A test on a modified KER nozzle cap for use with thermocouple trains completed over 1000 thermal cycles with no leakage. This section is remaining in the loop for further testing.

4. EIMO-8 - The loop was run for 72 hours at 350 C and 3100 psi for final shakedown testing. The loop is presently shut down for completion of final project revisions.

5. EIMO-10 - The loop remained shut down during the month, awaiting alterations needed to properly drain the loop and otherwise accommodate extremely active chemicals to be tested.

6. CEP-1 - The loop continued operation during the month on an extended series of Turco decontamination tests to determine long-range effects of Turco on loop components and materials. Coupons of stainless steel, stellite and Zircaloy-2, stressed samples of stainless steel, graphitar, and Zircaloy-2 NPR tube sections are being corrosion tested.

7. CEP-2 and CEP-4 - Installation of these loops is not yet complete.

8. ORA-1 - The loop continued operation at 700 F until September 18, when all test material was discharged. The loop remained down during the balance of the month, awaiting specifications and material for further testing.

9. 107 Basin Sealant Test - This test was terminated and the filter facility returned to normal during the month.

KER Loops

1. Loop 1 - The loop operated between 215 C and 225 C and at pH 10.0 during the month. The variation in operating temperature resulted from sluggish operation of the heat exchanger flow control valve. The valve was repaired during the September 30 outage. The loop is charged with six enriched 20 and 30 mil wall Zircaloy-2 clad, seven-rod cluster elements and a Pu-Al Zircaloy-2 clad, seven-rod cluster element. All charge material is authorized by PT IP-226-A, Supplement B.

   A loose connection in the heat exchanger exit thermocouple connector caused a scram from Loop 1 on September 11. This was repaired in time to permit scram recovery.

2. Loop 2 - The loop continued operation at 255 C and pH 10.0 during the month. The charge consists of seven, seven-rod Zircaloy-2 clad enriched clusters and a thermocouple train. All material is authorized by PT IP-226-A, Supplement A.

3. Loop 3 - The loop continued single-pass operation with dummies until September 7, when the tube was charged with three 1.6 per cent enriched, Zircaloy-2 clad tube-in-tube elements and a thermocouple train. This charge was authorized by PT IP-250-A, Supplement B. The loop operated at 255 C until September 25, at which time temperature was raised to 285 C. The loop operated at these conditions until September 30, when fuel element rupture indications caused a loop depressurization and reactor scram. Confirming evidence on the presence of a rupture was provided by radioanalysis indications of fission products in loop water and gamma scan indications of neptunium 239 on test coupons from the loop mock-up tube. Further confirmation was provided by large increases in beta and gamma readings on loop piping as well as sympathetic readings from neutron monitors on adjacent loops. Preliminary visual examination showed the outer surface of the inner tubes of two fuel elements to be badly corroded.

4. Loop 4 - Loop 4 remained shut down during the month, awaiting fuel element charges and opportunity for charging. A tube-in-tube fuel element charge was received on September 15.

Coolant Testing Operation Outage Performance

A total of 6.4 hours of reactor outage time was charged to Coolant Testing Operation during the month.

September 7	- Charge Loop 3 - PT IP-250-A, Supplement B	2.0
September 11	- Loop 1 Scram (caused described above)	0.5
September 30	- Charge Single-pass Tubes PT IP-250-A, Suppl. B	2.0
September 30	- Lost Production time from Loop 3 Rupture	1.9
	Total	6.4 hours

COMPONENT TESTING

Irradiated Fuel Element Examination

Examinations were completed on the fuel elements from the following 31 tubes during September:

PT No.	Tube No.	PT No.	Tube No.	PT No.	Tube No.
39A	0469-F	183A	3456-KW	231AC	1483-C
	3062-F		3558-KW		1579-C
	3053-F		3554-KW		2579-C
	2460-F	220A	2878-DR		2885-C
	4359-F		2866-DR		3389-C
178A	2566-KE		2871-DR		3480-C
	2275-KE		2770-DR		3986-C
	1863-KE		2862-DR	243A	2455-H
183A	3656-KW		2876-DR		2555-H
	3561-KW	231AC	1081-C	Reg.Solid	5455-KE
				Reg. I&E	2384-KE

Tubes 5455-KE and 2384-KE were discharged as suspected ruptures. Visual examination of the fuel elements from tube 5455-KE did not reveal a rupture. The fuel elements from tube 2384-KE were examined visually and then boiling water placed around them in an attempt to detect fission products. Neither examination revealed a rupture.

Process Tube Corrosion Monitoring Program

In-reactor measurements of 169 process tubes were made during the month. Listed below are the numbers of tubes measured per reactor and document numbers of the reports issued.

Reactor	No. of Tubes Probologged	Report No.	HW Number
B	43	40	61732
F	35	41	61920
B	26	42	61924
C	22	43	61961
H	43	44	62080

Visual examination, wall thickness and rib height measurements were completed on six tubes from B Reactor, five tubes from D Reactor and five tubes from DR Reactor. Thirteen of the 16 tubes were removed and examined to further investigate the extent of the accelerated top of the tube corrosion in second generation tubes. The measurements revealed that tubes which were installed in the latter part of 1956 and early part of 1957 have corroded just as much, and in some cases more, than tubes that were installed in 1955. The tubes that were installed in 1955 showed that the whole top wall is thinner due to corrosion. On the tubes that have been installed late in 1956 and early in 1957, only a very narrow strip is affected by corrosion on the top wall. Also a ledging type corrosion is more predominant on the top wall in tubes with the shorter operating periods.

Of the remaining three tubes examined, two were leakers 3786-D and 2869-DR; 3975-DR was removed for routine examination. It was impossible to lay out

3786-D because too many pieces were missing. However, it was estimated that the leak occurred between 9½ and 10½ feet from the rear van stone flange. The tube had a split approximately 11 inches long between the ribs. The leak was due to internal corrosion. No leak was found in tube 2869-DR. The tube was in the reactor only 12 months, and visual examination did not confirm that this tube was a leaker. Tube 3975-DR was picked to be probologged and removed for measurements to verify the calculated values on original reactor tubes. The Probolog and actual measurements revealed that the tube was 12 mils thinner than the calculated value.

Panellit Programs

During the month 301 gages were processed by Maintenance personnel. Of this number, 15 were rejected for a rejection rate of 5 per cent. This is an extremely sharp rejection rate reduction, amounting to 51.8 less than last month's 56.8 per cent.

In-Board Reliability Examinations were performed on 268 gages. Twenty-five of this number were found to be defective and were removed from service. This is a percentage defective of 9.3, slightly below the predicted 10 per cent defective per year.

A total of 2230 gages received in-board Bourdon coil leak examinations. Thirteen gages were confirmed as having ruptured at weld connections. This is a leak frequency rate of 0.58 per cent, slightly in excess of the average leak frequency rate of 0.47 per cent, established during the past 22 months.

Response times were determined on a total of 2318 gage-sensing line (gage to manifold) combinations during the month. Of this total, 101 indicated slow response and received corrective action. This amounts to a slow response detection frequency rate of 4.9 per cent.

Production Test IP-266-B, for on-reactor testing of 2B-X1 and 2B-X2 Panellit gage mercury switches, was started during the month. One row, 58 gages, was placed in service during the month, and 1740 exposure days were accumulated toward the test goal of 6000 exposure days. No defects were noted.

During the month, a new mobile inspection console was completed and placed in service. This console has been designed to permit increases in accuracy and rate of all phases of Component Testing in-board examination activities.

Forty-one gages received failure analysis during the month. Of this number, 26 were confirmed as having a malfunction.

Four boxes, 92 gages, were received from Panellit Inc. These gages were a part of the 600 gages being modified by Panellit Inc. Quality of this lot of 92 gages was good. Only three of the 92 had defects severe enough to require return to Panellit Inc. for repair or replacement.

During the month, 100 Bourdon coils and 130 switches were received and inspected prior to making them available to Maintenance shops. This activity results from the arrangement with the Spare Parts Operation wherein all critical Panellit gage spare parts will be inspected by Component Testing before being made available to using components.

INVENTIONS

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

Inventor	Title
None	None

O. H. Greager
Manager, Research and Engineering
IRRADIATION PROCESSING DEPARTMENT

B-C REACTOR OPERATION
SEPTEMBER, 1959

I. ORGANIZATION AND FUNCTIONS - No change

II. PERSONNEL

	AUGUST 31			SEPTEMBER 30			
	E	NE	Total	E	NE	Total	Change
B-C General	5	3	8	5	3	8	0
B Processing	16	38	54	16	38	54	0
C Processing	16	35	51	16	34	50	-1
B-C Power	14	95	109	16	96	111	+2
B-C Maintenance	23	105	128	23	106	129	+1
Total	74	276	350	75	277	352	+2

Movement of People - Exempt: R. W. Hooper, Assignment Supervisor, into B Processing (from Research and Engineering); H. N. Petty, Assignment Supervisor into B-C Power (from Community Water & Sewage Operation); Hooper and Petty were then assigned to the training code, 5030; C. A. Junghans, Supervisor I-B Processing, was deactivated (prolonged personal illness). Nonexempt: 7 transfers out including three to Code 5030, 1 resignation and 1 termination on leave of absence; 6 transfers in and 1 reactivation. Two temporary NE-to-E promotions are in effect at month-end.

III. PERSONNEL ACTIVITIES - 8 off-plant representatives of G. E. Financial components were conducted on a tour of B-C Area September 23 by A. R. Maguire.

IV. SAFETY AND SECURITY - There were 10 medical treatment injuries, one serious accident, and no disabling injuries, fires or security violations.

V. NON-ROUTINE REPORTS - HW62052 "Operational Interruption, B Reactor, September 12", by A. R. Maguire and "NPR Union Relations" September 9, by R. E. Toczek.

VI. COMPONENT ACTIVITIES

General

A. Administrative Activities - Suggested administrative procedures and organization structures for N Reactor Plant were reviewed and commented upon. The Bargaining Unit Contract was reviewed and suggested changes were sent to the IPD Union Relations Representative. Studies were started to simplify the bus transportation procedures at B-C Areas

B. Personnel Development - One Technical Graduate completed his rotational training assignment with C Processing. Eight exempt employees started participation in the Professional Business Management course.

C. Cost Control Activities - Revised Target Budgets for FY 1960 operating expenses were distributed to the operation components; preparation was

started on reason sheets for construction equipment and planned maintenance items to be submitted in the FY 1962 budgets and revision of budgets for FY 1961.

D. Landlord - Improvements at the Main Badge house were essentially completed. Office lighting improvements were continued. Plans were initiated to provide additional office space in 1713-B. Most of the planned vending machines have been installed in the Area.

E. Suggestions - In progress at start of month - 42; received - 19; completed - 22; end of month - 39.

B PROCESSING

A. Production - Input production was 106.1 percent of forecast. Limiting factors were tube power and graphite temperature. TOE was 83.3 percent. Rupture potential considerations permitted an increase in tube powers due to slightly lower inlet water temperatures.

B. Operating Experience - There were three unscheduled outages; recovery was made on one.

Day	Outage Hours	Cause
10	39.5	Panellit scram row 13.
12	1.3	Panellit scram row 46.
12	79.5	Panellit scram row 13

The reactor was scrammed on September 10 by a panellit trip on row 13 because of small pieces of neoprene plugging the orifice screen of Tube No. 1353. Excess outage time was utilized for charge-discharge, planned maintenance, and project work. A similar scram occurred September 12 on row 46. The cause of the scram was undetermined at the time, and operation was resumed after 1.3 hours. Several hours later the same day another scram occurred from a row 13 panellit trip. Extensive checks revealed pieces of neoprene in all seven near-side process water header basket screens, in all crossheader screens, and in three process tube orifice screens. The source of the neoprene was found to be a deteriorated curtain seal in the No. 4 Process Water Storage Tank, 190-B Building. A portion of this seal had fallen into the storage tank and became dispersed throughout the downstream process water supply system. The process water supply screens and piping were cleaned and flushed. Operation was resumed on September 15, concluding an outage of 79.5 hours. Approximately forty hours of the outage were utilized in the performance of project amd maintenance work in the discharge area. The details of the incident are reported in "Operational Interruption - B Reactor", HW-62052.

C. Equipment Experience - Three hoppers of 3X balls were replaced with reconditioned, 30% - 70% blended balls for the reduction of radiation levels. Twenty-seven tubes were probologged; three were held for replacement. Twenty-one defective rear neoprene boots were replaced. A "cotton glove" inspection of all front connectors revealed 106 to have single broken strands in the stainless steel covering; visual inspection and analysis of a sample lot indicated the breaks were due to mechanical damage and did not reduce the

pigtail reliability. A Component Testing inspection of all panellit gauges revealed one stuck gauge and twelve gauges with slow response time: corrections were made. A loaded cart of metal fell into the C elevator pit via the metal loader; details are reported in Serious Accident Investigation Report No. 59-14.

D. Improvement Experience - Work was continued on the installation of new drip-leg instrumentation (CG-706). Exhaust vents were installed in 115 Building (CG-780). CG-791 - Reactor Confinement - Work was continued on the installation of a new isolation fence south of the 105 B Building; excavation of the filter building site has begun. CG-817 - Crossheader Pressure Differential Indicators - All tubing and gauges have been installed, and continuity checks have been made. The installation of the continuous rear-face air monitoring equipment was completed and tested satisfactorily. Work was continued on the installation of an access hole from the top of the unit to the rear-face catwalk.

E. Radiation Monitoring Experience - An operator received unmonitored exposure while washing down the transfer area; his exposure was subsequently determined to be approximately 100 mr for the work he performed. Pick-up tong fulcrums contaminated to 3,500 mrads/hr were found on the floor near the pick-up chutes; floor smears indicated 1,000 c/m.

Follow-up surveys after burial of thermocouple wire indicated pieces of wire on the storage area floor and on the ground outside the wash pad, with dose rates up to 35 rads at one inch. Survey of the burial ground route disclosed 26 spots on the roadway, with dose rates up to 600 mrads/hr. There was no further contamination spread and decontamination was successful.

Dose rates at 40 check points in the rear face averaged 77 mr/hr. Personnel dose rates up to the following levels were experienced for the following work: dummy burial, 500 mr/hr; thermocouple wire burial, 2 r/hr; exit water thermohm maintenance, 350 mr/hr; back-filling burial ground trench, 2 r/hr. Lead bricks stored at the burial ground were found to be contaminated to 10,000 c/m of tritium, as measured by smear surveys.

F. Events Influencing Costs - 300 overtime hours were utilized. 13,360 dummy pieces were reclaimed for reuse. Helium consumption was 237,450 cubic feet compared to 266,355 cubic feet in August.

C PROCESSING

A. Production - Input production was 85.6 percent of forecast. Power level was controlled by a tube power rupture control limit during the first half of the month and by graphite temperature limits the latter half. TOE was 65.4 percent.

B. Operating Experience - Five unscheduled outages were experienced not counting a scheduled outage initiated August 31. Scram recovery was made on three.

Day	Hours	Cause
1	83.3	Scheduled shutdown August 31 for planned work.
4	0.4	Beckman scram during range change.
10	133.6	Panellit trip on row 38 - cause undetermined. Insufficient reactivity for recovery. Preplanned outage work accomplished

Day	Hours	Cause
15	0.4	Panellit trip, oscillating gauge 3367.
17	0.8	Rupture suspect - tube 1077 (regular I&E metal). Quickie discharge successful.
18	30.9	Rupture - tube 1081 (depleted slug).

The slugs discharged from rupture suspect tube 1077 could not be retrieved for confirmation. A depleted metal rupture in tube 1081 required a force of 11,500 pounds for removal. Examination of the rupture slug revealed that it had ruptured both internally and externally.

C. Equipment Experience - The rear elevator equalizing mechanism failed and permitted the elevator to become cocked; eight hours of outage time were required for corrective and improvement measures. 23 vertical bundles of replacement thermocouple wires were pulled in to the rear face and 20 were placed in service. 140 rear gas seal bellows were foamed. The 32-mesh screens were replaced with 8-mesh screens on 20 front crossheaders.

D. Improvement Experience - PT-IP-231-A - Irradiation of Depleted Uranium to High Exposure - The ruptured slug reported under Operating Experience had been originally charged under PT-IP-132-AC and continued under PT-IP-231-A; the seven remaining tubes containing depleted metal charged under this production test were discharged, as were 11 tubes containing I&E - E metal supporting the depleted charges. PT-IP-259-A - Measurement of Annular Temperature Distribution In Badly Corroded Process Tubes at C Reactor - Downstream thermocouple trains were installed in tubes 3773 and 3774, and both tubes charged with weighed and measured regular I&E metal.

CG-817 - Crossheader Pressure Differential Indicators - Valves and copper tubing were installed on all the front crossheaders. CG-791 - Reactor Confinement - The installation of the fog spray equipment was completed with the exception of the controlling components; the system can be operated manually, if necessary. CG-666 - Zone Temperature Monitor - Installation of the special elbows containing the temperature monitor detectors was completed on six rear rows; the special elbows for the rate-of-rise instrumentation were also installed on these rows. CG-807 - Sub-Critical Monitoring - Step plugs were installed in the G and H test holes; a new instrument panel was installed in the control room and work started on the wiring of the panel.

E. Radiation Monitoring Experience - There were two cases of skin contamination up to 4000 c/m; both were easily decontaminated. Significant personnel dose rates during the month were: installation of sub-critical monitor on X-level - 2000 mr/hr; rupture discharge - 2000 mr/hr; work on Ball 3X system - 800 mr/hr.

F. Events Influencing Costs - 511 overtime hours were required.

POWER OPERATION

A. Operating Experience - The raw water export system was carried by 100-B Area without difficulties. In preparation for next year's hot weather,

oil circuit breaker replacements were started on the 181-C pump units. No difficulty has been experienced in controlling the feed of liquid dichromate; study is being made on the possibility of converting 100-B Area to liquid dichromate also. The rubber curtain seals have been removed from all 4 190-B storage tanks; Nos. 1, 2, and 3 tanks are being reinspected due to quantities of shredded rubber found on crossheader screens and near valve pit screens. An Acceleration Test was conducted on No. 4 boiler; the boiler load pickup was satisfactory.

B. Equipment Experience - At 190-C Building, carbon seal rings were replaced on No. 3 pump turbine. At 190-B Building, the installation of Fisher Control Valves on process turbines has been resumed. At 183-B Building, Roberts Filter Control Valves were installed in No. 11 filter. The Bauxite Feeders have not been available this month. At 184-B Building, a new Baffle Wall was installed in No. 1 boiler as recommended by the Third Party Inspector.

C. Improvement Experience - The impellers on pumps No. 2 and 3 in 190-C were replaced with the new design impeller. 58-IP Aluminum Oxide Sulphuric Acid Feeders 183-B - installation of the new Prototype Reaction Chamber was started. A-90668 Repair 190-B Tank Room Roof - Project Complete.

D. Events Influencing Costs - Costs were increased due to increased steam generation and removing curtain seal from 190-B tanks.

MAINTENANCE OPERATION

A. Equipment Experience - Twenty-three new exit temperature monitor thermocouple bundles were installed for a total of 24 installed bundles; twenty-one bundles are hooked up and in service and the remaining bundles are fabricated. Two 8-point exit water thermocouple trains were installed on Tubes 3773 and 3774. Gas Bellows Seals - The installation of 19 boots at 105-B completes the initial program of correcting major gas leak sources and gas loss has been reduced 20 per cent; at 105-C, 140 rear face bellows were filled with silicone foam rubber.

B. Maintenance Engineering - B Reactor Graphite Stringer Modifications - The conversion of the control room instrumentation to permit read-out of the Geminol thermocouples is now complete except for painting the panels; all seven stringers can now be read on an indicator and/or recorded in the control room. Pressure Monitor Surge Suppressors - B and C Reactors -The vendor surge suppressor fabrication problems have been resolved, both encapsulated and unencapsulated, and surge suppresors have been examined and approved. Orders are being placed for mass installation.

C. Special Training - Training classes have been started for electrical personnel in Industrial Electronics, based on a General Electric Company course, with C. E. Franz as instructor. A great deal of interest outside the Area has been shown in this training session.

D. Planning and Scheduling - 8,337 man hours of Productive Maintenance work were scheduled and 96 per cent was completed.

A. R. Maguire
Manager
B-C Reactor Operation

AR Maguire:ILH:dip

D-DR REACTOR OPERATION

SEPTEMBER, 1959

I. ORGANIZATION AND FUNCTIONS - No Change.

II. PERSONNEL

A. Force Summary

	August 31, 1959			September 30, 1959			Net
	NE	E	Total	NE	E	Total	Change
General	3	5	8	3	5	8	0
D Processing	39	16	55	39	16	55	0
DR Processing	33	15	48	33	15	48	0
Power	100	14	114	102	14	116	+2
Maintenance	132	21	153	131	20	151	-2
	307	71	378	308	70	378	0

B. Movement of People - Effective September 1, D. S. Lewis, Manager, H Processing Operation, and E. T. Hubbard, Manager, DR Processing Operation, exchanged positions. M. W. Bjur was promoted from Maintenance Engineer II to Maintenance Engineer I within D-DR Maintenance Operation. H. G. DeVoss, Supervisor, Maintenance Engineering, D-DR Maintenance Operation was transferred to the NPR Project Section as Senior Engineer - Reactor. Nonexempt personnel movement during September included 7 transfers in, 1 reactivate, 4 transfers out, and 3 terminations, one each due to death, retirement, and reduction of force.

III. PERSONNEL ACTIVITIES - Routine

IV. SAFETY AND SECURITY - There were 11 medical treatment injuries and no security violations during September.

V. NON-ROUTINE REPORTS - None were issued.

VI. COMPONENT ACTIVITIES

GENERAL

A. Administration - A meeting was held with D-DR Reactor Operation managers to discuss recommended changes in the General Electric - HAMTC Contract. A report covering the recommendations was submitted on September 14 to the Manager, Manufacturing. A review was made of the Supervisor Selection Program and nominations were submitted to the Specialist, Personnel Placement.

B. Suggestions - Suggestions in process at beginning of month 31, submitted 13, reopened 1, completed 17, in process at month end 28.

C. Personnel Development - A proposed exempt training program for the next 18 months was developed and submitted for consideration by D-DR Reactor

Operation managers. The program is aimed at meeting D-DR Reactor Operation's obligations toward NPR manpower requirements, replacements needed due to attrition, and broadening the functional experience of exempt people. A summary of Manufacturing Section training needs was submitted for consideration by the proposed training task force. A significant number of D-DR Reactor Operation people attended the K Reactor Operation's Nuclear Safety Review meeting, held in 1707 AD on September 25. One Rotational Technical Graduate was on assignment to the Operation at month end.

D. Cost Control - The FY-1960 D-DR Reactor Operating Expense budget was reviewed and potential sources for reductions were submitted in a report to the Manager, Manufacturing. A priority listing of the D-DR Equipment Budget items was made with the same objective of seeking reduction sources. A review was held, as part of the Exempt Employee Monthly Review Meeting, of items in progress which will result in cost reductions. These items will be included in the quarterly Representative Economy Measure reports as appropriate. A D-DR Reactor Operation meeting was held to begin preparation of the FY-1962 and review of the FY-1961 Plant Acquisition and Construction, Equipment and Planned Maintenance Budgets. A representative of Facilities Engineering Operation discussed a long range planning study, currently under way as it affects preparation of the FY-1962 P.A.C. Budget. A representative of the Financial Operation discussed the monthly Operating Cost Report, explaining the charges in each of the various line items, in the D-DR Reactor Operation monthly cost meeting.

E. Landlord - The feasibility of reducing the area of the 100-D limited access zone to approximately one-half its present size was again investigated. The decision was made to hold plans in abeyance until the knowledge and experienced gained from the operation at 100-F Area can be utilized in scoping 100-D changes.

D PROCESSING OPERATION

A. Production

Input production was 119.2 per cent of official forecast. Operating levels were limited by the bulk outlet temperature and by rupture control tube power. Time operated efficiency for September was 94.3 per cent, which was 109.7 per cent of official forecast. September production established an all-time high for D Reactor.

B. Operating Continuity

1. Operating Continuity - There was one unscheduled outage during the month:

Date	Hours	Reason
9-17-59	40.8	Scram, improperly installed panellit jumper on a PCCF tube. Could not recover.

2. Equipment Experience - A removal problem on VSR #22 was corrected by clutch adjustment during the September 17 outage. Rear face inspection showed satisfactory conditions as to pigtail cracks. It was necessary to increase reactor gas pressure after startup

to maintain gas purity. Recent analyses indicate satisfactory conditions. Flattening control consisted of 5 spline removals, 9 insertions and with 9 remaining in the reactor at month end.

C. Improvement Experience - CG-780 "Improved Ventilation - Buildings 105 and 115-B, D, and F" - Progress is unchanged from last month. Remaining work is installation of a roof exhauster and ventilation balancing. CG-791 "Reactor Confinement" - Excavation for the filter building continued during the month. CG-817 "Crossheader Differential and Alarm System" - Installation of the alarm system and controls on C elevator was started during the month. The equipment is in use in its present state although the C elevator annunciator system is not complete.

D. Radiation Monitoring Experience - Two lapses of radiation control occurred during the month. The first resulted from tube removal equipment with over-limit dose rates found in the 115 building repair shop. Through a faulty control switch on the dummy elevator a HAPO 184 sample continued to rise after the stop button was engaged, creating the second lapse. A maximum dose rate of 1 R/hr was received with 25 mr of exposure. Highest dose rates received during the month was 2.5 R/hr burying perfs and 2 R/hr burying 3X balls.

E. Events Influencing Cost

1. Overtime - Overtime usage was as follows:

Nonexempt Shift Overlap		15.5 Hours
Shutdown Coverage		56.2
Exempt Overtime		8.0
	Total	79.7 Hours

DR PROCESSING OPERATION

A. Production

Input production was 117.3 per cent of the official forecast. Time operated efficiency was 94.4 per cent, which was 111.1 per cent of forecast. Levels were limited by rupture control tube power. Production was higher than forecast due primarily to higher than predicted TOE.

B. Operating Experience

1. Operating Continuity

Operation was interrupted by four unscheduled outages.

Date	Hours	Reason
9-14-59	38.7	Ruptured slug, tube 1689-DR.
9-15-59	0.4	Beckman high trips following startup.
9-16-59	0.9	Spurious pannelit scram on unknown gauge on 24 row.
9-20-59	0.2	Scram due to jumpering wrong gauge during PCCF work.
Total	40.2	

2. Equipment Experience - A side failure rupture was discharged from 1689-DR with hydraulic forces up to 4000 pounds. The tube proved to be a leaker and was replaced. A significant gas leak was located and corrected at a ball hopper on top of the unit. A water leak on the rear face from a blown out thermocouple well on a J type pigtail was found and corrected. This leak did not interrupt reactor operation. Seven inoperable thermocouples were installed in the top of both downcomers for bulk outlet temperature studies.

C. Improvement Experience - CG-791 "Reactor Confinement" - Work consisted chiefly in testing the monitoring equipment which has been installed in the fan room as part of the project. CG-706 "Improved Gas Instrumentation" - Work was confined to running sections of tubing between 105-DR and 115-D buildings. AEC 160 Recirculating Gas Loop - Performance testing continued during the month. Arrival of the first fuel element is expected in October.

D. Radiation Monitoring Experience - There were three lapses of radiation control during the month. A highly irradiated perf, inadvertently left in a tube previously, was withdrawn on the C elevator. Dose rate on the perf was 20 R/hr but exposure received was confined to 5 mrads. Irradiated poison slugs were inadvertently handled by two operators, who received 220 mrads of unplanned exposure. A non-posted radiation zone was found at the weasel pit where hot tongs had been tied and low level contamination resulted.

E. Events Influencing Costs - The overtime usage rate was 2.57 per cent.

D-DR POWER OPERATION

A. Operating Experience - Boiler operation was satisfactory during September. The steam generating load was 117,331 pounds per hour average, and 136,000 pounds per hour maximum. The evaporation rate was 7.50. A surge on the export system occurred on September 14, when the Groves Valve in the 105-DR Valve Pit opened due to a faulty relief valve leaking through on the south impulse line.

B. Equipment Experience - Addition of specially graded anthrafilt in each of the 183-D filters was completed during the month. Installation of acoustical material for noise control in the 190-D conference room and control room was finished early in the month. The cooling water supply lines to the 190-DR annex pump oiler coolers were replaced and isolated from the flywheels and motor cooling system.

C. Events Influencing Costs - No unusual cost variations.

D-DR MAINTENANCE OPERATION

A. Equipment Experience - Work connected with removal of the D elevator cab in 105-D consisted of removal of an 8-foot concrete step plug in the machinery room and installation of a six-inch framed lead shield in its place on the lower step. The lead provides adequate shielding for further machinery room work while the unit is operating. Acid storage and handling facilities at the 105-DR wash pad are virtually complete. The No. 4 and

No. 14 pumps in 181-D were completely dismantled for overhaul. The upper section of the pump shaft of No. 4 was remetalized and that of No. 14 will require similar work plus a complete rewedging. A defective switch at the 105-D dummy elevator, which caused a radiation incident is to be replaced with a weather proof unit since rain water penetration was the cause.

B. Maintenance Engineering - Reactor Safety Circuit Trip Identification - A contract has been awarded for the purchase of vertical jumpers for the Panellit system at 105-DR. Delivery is promised in October. Final contract price for these jumpers is approximately one-third of the original quotation. Installation work is 95 per cent complete. Modification of Control Room VSR Switch Panels, 105-D-DR - Modification of existing panels, is needed to provide space for programmed Ball 3X changes, up-date existing equipment, and to provide control facilities for future installations. Replacement of all VSR control switches at 105-D is planned to improve system reliability. Improved Panellit Ground Detector - Design Change No. 318 was written to authorize installation of an improved Panellit detector at 105-D-DR. Circulation for approval signatures is in progress. Transfer Area Syphon Revisions - A new piping arrangement for the transfer area syphon was fabricated, installed, and tested with satisfactory results.

C. Planning and Scheduling - During the month 12 Class A, 51 Class B, and 27 Class C inspections and overhauls were made. In addition, the scheduled lubrication and checking of all equipment in both reactor buildings was performed during the month. There was no significant change in the backlog of work, although a slight increase was noted in the carpenter, painter, pipefitter, serviceman, and rigger crafts.

D. Events Influencing Costs - During the month instrument technicians in 105-D and 105-DR had one human error scram each. DR made a quick recovery, and D took a minimum outage. Overtime usage for the month is as follows:

Nonexempt	-	502 man hours
Exempt	-	75 man hours

WD Richmond
Manager
D-DR Reactor Operation

WD Richmond:JDR:met

F REACTOR OPERATION
SEPTEMBER -- 1959

I. ORGANIZATION AND FUNCTIONS

No change.

II. PERSONNEL

A. Force Report

	August 31			September 30			Net Change
	E	NE	Total	E	NE	Total	of Total
General	3	2	5	3	2	5	0
Processing	15	37	52	15	38	53	+1
Power	7	51	58	7	50	57	-1
Maintenance	14	71	85	14	69	83	-2
Total	39	161	200	39	159	198	-2

B. Movement of People

There were no changes in exempt personnel.

Nonexempt personnel changes included one resignation, one leave of absence due to personal illness, three transfers in and three transfers out, including reclassification of C. J. Crane, Instrument Technician to Service Manual Writer, FEO.

III. PERSONNEL ACTIVITIES

Three Processing Operators enrolled in Reactor Fundamentals Training Course for Utility Operators, attending the first session in September.

The information meeting conducted by Dr. A. B. Greninger, Manager - Irradiation Processing Department, was attended by 23 F Area personnel.

Two information meetings were conducted by C. N. Gross, Manager - F Reactor Operation, with 17 nonexempt employees attending.

IV. SAFETY AND SECURITY

Three medical treatment injuries were reported. There were no disabling injuries reported. There was one security violation reported.

V. NONROUTINE REPORTS ISSUED

IPD Radiation Occurrence Investigation Report, HW-61952, by W.G. Westover.

VI. COMPONENT ACTIVITIES

GENERAL

A. Administration

A list of candidates for supervisory positions was submitted to Relations Practices Operation.

Current training needs for F Reactor Operation employees were submitted.

B. Personnel Development

An information meeting on Union Relations was sponsored. R. J. Schier, Manager - Relations Operation, conducted the meeting with 23 exempt personnel from 100-F and H Areas attending.

S. A. Krieg, Technical Graduate, was assigned to F Processing Operation effective September 14.

C. Costs

Preliminary review meetings were held on Operating Budgets for FY-1961 and FY-1962. Also, the Operating Budget for the balance of FY-1960 was reviewed from the standpoint of cost reductions.

D. Landlord

Service installations for vending machines were completed and vending machines placements were made by the Automatic Canteen Vending Company representative.

Assistance was given the Project Engineer on construction activities connected with relocation of the new perimeter fence and badge house.

The cycle painting program was reviewed and work authorizations issued for FY-1960.

E. Suggestion Evaluation

Suggestions on hand at start of month: 49; received: 8; evaluated and returned: 17; on hand at end of month: 40.

F PROCESSING OPERATION

A. Production

Input production was 100.4 percent of forecast, with a TOE of 70.5 per cent. Maximum operating limits were limited by rupture control tube power limits.

B. Operating Experience

1. Operating Continuity

Outage Date	Hours	Reason
9-9-59	105.4	Excessive water collection.
9-16-59	36.1	Excessive water collection.
9-18-59	29.7	Panellit trip on 1461.
9-26-59	41.1	Ruptured rear pigtail (4271)
Total	212.3	

C. Equipment Experience

1. Tube Replacement - A total of 46 tubes was probologged and 18 were replaced due to external corrosion. Three air channels were retubed for a total of 21 new tubes installed. Three tubes were removed due to tube leaks and left as air channels.

2. Stuck Charge 4259 - Charge stuck after charging downstream dummies, plus 15 pieces of metal. Charge broke loose with Blackhawk at 2800 psi and discharged with charge machine. Tube pressure tested and charged with solid aluminum dummies.

3. Water Leaks - Excessive water collections necessitated two reactor shutdowns. Combinations of pressurizing headers and helium leak detecting confirmed the following leaks:

0162 - rear flange leak
0163 - " " "
0166 - " " "
0168 - " " "
0187 - tube leak
0264 - rear flange leak
0380 - " " "
0393 - tube leak
0488 - rear flange leak
0961 - " " "
1094 - " " "
1095 - " " "
1182 - " " "
1184 - rear flange leak
1195 - " " "
1271 - " " "
1273 - " " "
1278 - " " "
1279 - " " "
1283 - " " "
1366 - tube leak
1465 - rear flange leak
1467 - " " "
1795 - " " "
3052 - " " "
3056 - " " "

Flange leaks were repaired by either tightening the nozzle or replacing the nozzle gasket.

4. Rear Pigtails - A rear pigtail failure on tube 4271 resulted in the third scram from pigtail failure since June, 1959. A long-range inspection program of rear pigtails indicates the need for replacement as soon as feasible.

5. Gas Conservation - Six leaking rear face bellows boots and three front bellows boots were replaced.

6. G Stringer - A special 7 I-C thermocouple stringer was installed in channel 1284.

7. Draw Down Test - A draw down test was completed. Results were satisfactory and within one per cent agreement with indicated transmitter flow.

8. Borescope - Channel 4575 - The tube bearing blocks in channel 4575 were borescoped. All seven blocks showed significant horizontal cracks, and the first and seventh also have vertical breaks.

9. 1904 Outfall Line - Inspection of outfall lines showed open points where the lines join the outfall structure. Work was authorized to determine the extent of repairs needed.

D. Improvement Experience

1. CG-707 - Start-up Instrumentation - Completed installation of sub-critical monitor on one channel.

2. CG-791 - Reactor Confinement - Work continued throughout the month.

3. VanStone Seal Inserts - Installed rear Vanstone seal inserts in 20 tubes according to PT-279-E (Reactor Test of VanStone Seal Inserts).

E. Radiation Monitoring Activities

One lapse of radiation control was incurred by F Reactor Operation when a processing operator incurred an uncontrolled exposure while a graphite stringer was being discharged from a process tube. The total exposure was less than 30 mr. The incident was investigated and reported separately in HW-61952. Personnel exposure rates during the month were at generally low levels with a maximum of 1.5 r/hour incurred during recharging of a special irradiation sample in the "E" hole facility. No cases of personal contamination were incurred during the month. Radiation surveys showed no evidence of reactor gas leakage on the F Reactor charge face.

F POWER OPERATION

A. Operating Activities

In connection with the study for improved reliability of steam generating facilities, the performance of No. 3 boiler during an acceleration test conducted on September 16 was witnessed by Mr. E. W. Reed, Mechanical Engineer Consultant from the Los Angeles Power and Light Company, J. T. Long, A. K. Hardin and F. Jape from Process Standards, and S. Baudendistel and M. P. Johnson from Facilities Engineering.

Seven process water pump operation was resumed on September 17.

B. Equipment Experience

The Nylon drive key for main lubricating oil pump on 8A unit was inspected on September 9. There was no noticeable change in wear and stress on this key since last inspection on August 7.

The sand depth in the 183 Building filter beds was measured on September 10. The average depth of sand in each filter was found to be approximately 6 inches.

The original 4 inch float controlled valves on the fill lines to the 105 high tanks were replaced with Davis Single Seated Float Controlled valves.

C. Improvement Experience

182 FA Pump Test Stand - The design change for raw water supply from emergency raw water header in 182-F Building to the new facility has been completed. Other work is about 98 percent completed.

D. Events Influencing Costs

Maintenance costs were increased by refractory replacement on No. 1 and No. 4 boilers, installation of 12 four-inch valves in the Palmer Sweep water supply lines and replacement of the 105 high tank float valves.

F MAINTENANCE OPERATION

A. Equipment Experience

1. Instruments - Twenty-four reactor temperature monitor system thermocouples were repaired, including installation of one new leadwire.

   During the month, 23 Panellit gages were replaced and 136 gages required adjustments.

2. Electrical - Voltage drop out tests and a visual inspection of each clutch and slip ring was completed on the vertical rod drive assemblies. Ten brushes were replaced and numerous brush holders adjusted for proper brush tension.

   Following an inspection of the 190 annex process pump motor drive slip rings and brushes, the brushes on the No. 8 unit were replaced.

3. Mechanical - Dismantling of the tool dolly on the "D" elevator was continued and is now 95 percent complete.

   New Garlock ring gaskets were installed for evaluation on rear face nozzle caps on rows 44 and 45.

   The No. 4 condenser pump at the 182 Building was taken out of service and repairs are to be made upon receipt of replacement parts.

B. Maintenance Engineering

1. Instrument Engineering

105-F Graphite Stringers - Test stringer (ref. DT-IP-26-0) using seven thermocouples of 14 gage iron-constantan wire was installed.

2. Electrical Engineering

105 Annunciator - Design changes to relocate the rod water alarm and modify the PCCF alarm are 50 percent complete.

3. Mechanical Engineering

Charge Seating Machine - 105-F - Modifications and preliminary testing of the charge seating machine have been completed.

C. Property Control

The formal inventory of Fixed Plant & Equipment was started during the month.

One truck load of equipment consisting of old benches and tables, a hot water tank, electric motors, and other miscellaneous items was excessed.

Planning & Scheduling

Approximately 25 percent of available manpower was assigned to Productive Maintenance work. The activity included the completion of eight class "A" overhauls and 329 Class "B" overhauls.

D. Events Influencing Costs

In maintaining the F Reactor facilities, a total of 785.6 nonexempt overtime hours and 157 exempt overtime hours were required.

R G Clough

ACTING MANAGER
F REACTOR OPERATION

RG Clough:GBJ:det

H REACTOR OPERATION

SEPTEMBER, 1959

I. ORGANIZATION AND FUNCTION

No change.

II. PERSONNEL

A. Force Summary

	August 31			September 30			Net Change
	E	NE	Total	E	NE	Total	Of Total
General	3	1	4	3	1	4	0
Processing	16	36	52	16	36	52	0
Power	8	51	59	8	52	60	+1
Maintenance	*14	61	75	14	61	75	0
Central Maintenance	18	114	132	18	111	129	-3
Total	59	263	322	59	261	320	-2

*Indicates correction from last month's report.

B. Movement of People

Exempt personnel movements consisted of the transfer of D. S. Lewis, Manager, H Processing Operation, to the D-DR Reactor Operation, replaced by E. T. Hubbard former Manager, DR Processing Operation, and the transfer of M. P. Johnson, Manager, H Power Operation to Facilities Engineering Operation, replaced by G. W. Wells former Engineer, KE-KW Power Operation, who is serving in an acting capacity.

Non-exempt personnel movements consisted of one leave of absence; one ROF; two terminations; three transfers in; and one transfer out.

III. PERSONNEL ACTIVITIES

Messers. Collins, Myers, Owen, Sullivan, Frymier, Benham, Mallow, Nickles, and Rossiter attended a Union Relations Conference conducted by R. J. Schier.

IV. SAFETY AND SECURITY

There were no disabling injuries or security violations during the month. There were five medical treatment injuries reported.

V. NON-ROUTINE REPORTS

None.

VI. COMPONENT ACTIVITIES

General

A. Administrative Activities

Routine during the month.

B. Personnel Development

Nothing significant to report.

C. Cost Control Activities

Routine during the month.

D. Landlord Activities

Rewiring of the 1760 and 1761-H Buildings was completed and accepted.

E. Suggestion Evaluations

On hand at beginning of month - 28; received during month - 9; completed - 1; on hand at end of month - 36.

Processing Operation

A. Production

Input production was 6.7 percent above forecast.

Equilibrium power levels reached 1605 MW and were governed by administrative operating limits for rupture control. The tube power operating limit was raised from 990 KW to 1020 KW on September 25.

B. Operating Experience

1. Operating Continuity

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

Date	Hours	Reason
9-20-59	119.4	Scheduled for charge-discharge, tube replacement, and project work.

2. Equipment Experience

a. Process Tubes - Fourteen process tubes were replaced. Ten of these were because of normal tube corrosion. The other four were 63-S tubes removed because of poor performance history on this type of tube.

Forty-three tubes were probologged.

b. Panellit System - Eighty-nine additional 10-90 range gauges were installed; 42.9 percent of the board now contains 10-90 gauges.

c. Rear Pigtails - Three of the O-ring style connectors installed last January, and one of the fringe old style connectors were found to have split failures. A total of 42 pigtails were replaced to correct serious rear face leaks from O-ring and pigtail failures. FEO has begun an accelerated program to design a suitable rear face connector for H Reactor.

d. Near Downcomer - An inspection following several months operation at full flow with 8 pumps was made with the observation that it is generally sound.

e. 1904 Outfall - Thermal expansion stresses on the effluent discharge pipes to the river have caused the concrete to break away around the pipe retainer rings. A study by Plant and Industrial Engineering Operation to determine corrective action has been started.

f. Crossheader Sample Lines - Split failure of a far stainless steel sample line on the rear face was noted on the last startup. The extent of this problem will be investigated on the next outage.

C. Improvement Experience

1. The continuity check for Project CG-666, Zone Temperature Monitoring, was completed. After a few open circuits are corrected, it should be ready for operational use.

2. The low level flux monitoring installation in "Y" test hole was completed and operated satisfactorily on startup. This is part of Project CG-707.

3. The fog spray piping for CG-791 was installed on the rear face during the last outage.

4. Design Change 225-H, "105-H Undervoltage Contacts, Safety Circuit Deletion," was completed.

5. The first mass premarking of and preinsertion of dummies in the tubes on the charge-discharge list was accomplished. This is one more phase of the program to improve charging rates.

6. Pickups were installed on rear face connectors to determine the vibration pattern of the rear face piping.

7. The demonstrating EN blanket loading, PT-IP-225-A-9-FP, was charged during the last outage.

D. Radiation Experience

The Y-hole step plug and test hole assembly were removed and replaced with a flux monitor without incident. Dose rates of 300 mr/hr and

100 mrem/hr. of neutrons are present at the new installation but no beams of radiation have been detected.

Three H Reactor lapses of radiation control included: skin contamination which occurred during a ball 3X hopper check, a failure to wear respiratory protection during welding on the rear face, and work performed on the rear face without properly established exposure rates.

Month Totals -	Lapses of Control	3
	Radiation Occurrences	6
	Skin Contaminations	4
	Personal Clothing Contaminations	1
	High Personnel Dose Rates	1
	Total Hand Counts	2300

All cases of skin contamination were completely decontaminated. The personal clothing was discarded to waste.

E. Events Influencing Costs

Overtime for the month consisted of 28.0 hours.

Power Operation

A. Operating Experience

Electrical power surges were experienced on September 13, but no operating equipment was affected.

Average steam generating rate was 68,200 pounds per hour. An evaporation rate of 7.95 pounds of steam per pound of coal was attained.

A leak developed in the west 36-inch filtered water supply header in the south run adjacent to 190 tank room. The caulked joint was repoured and the system was returned to normal on September 24. The leak had no adverse effect on production since the system was operating at reduced pressure.

Standard quality water was produced throughout the month with an average alum feed of 6.2 ppm.

B. Equipment Experience

Preliminary soundings were made of the 181-H Building forebay on September 1. Although the sandbar has grown in height and breadth, we do not consider that this will be a critical problem until the deposit following next spring's run-off. No. 2 export water pump at the 182-H Building remained out of service the entire month since replacement parts have not been received from the vendor. In the 183-H Building, inspections were completed to No. 1, 2, and 3 process pump motors. Both raw water cone valves were inspected and lubricated. All but two defective lubricators on No. 7 flocculator shafts were replaced. The

other faulty lubricators will be replaced when additional units are received from the vendor. The west filtered water clearwell and the No. 15 flocculator drive mechanism was inspected. The emergency generator stator in the 184-H Building was rewedged under the direction of a GE service representative. The loose wedges were attributed to normal coil shrinkage. The impeller of the No. 8 annex pump in the 190-H Building was inspected for cavitational wear. Slight cavitation was noted on the first stage wheel but is much improved over previous running assemblies. This is the first installed assembly of the improved DeLaval design and has been in operation for approximately six months. The experimental "Defrin" (duPont) geared oil pump drive key was removed from No. 7 annex pump unit because of distortion.

Maintenance Operation

A. Field Maintenance

An inspection of the 105 transfer area crane revealed that the mechanical brake in the gear reducer has not been functioning. The crane is presently operable, and will be repaired upon arrival of the parts from the vendor.

The original monorail curved sections of the Ball 3X monorail, fabricated by Construction, had irregularities on the electrical pickup which caused the motor to stall at these locations. New curved tracks have been installed. Electrical continuity is still troublesome. When this is repaired, the Ball 3X ball removal system is complete.

The rear face timekeeping and C-D elevator communications were out of service due to moisture in the rear face caused from leaking pigtails. The systems are not waterproofed or designed for this type service. A program is now in progress to waterproof all communications and D elevator electrical systems before the fog spray is put in service.

An overhaul of Nos. 1 and 2 horizontal control rod hose reels in the 105 Building revealed that the bearings were seized due to lack of lubrication -- several inner races were turning on the shafts. Two hose reels will be scheduled during each future outage until all are overhauled.

B. Engineering

The downcomer dip-tube installation, used for monitoring water level on the top tray, was inspected and found in good condition. An estimate was prepared for the installation of the downcomer level and pressure instrumentation.

A thermocouple stringer consisting of six iron constantan thermocouples was designed and fabricated for monitoring temperatures in reactor thermal shield cooling tube No. 70. It will be installed when the tube, which is presently plugged, is made available.

The characteristics curves of the protective coordination system are being reviewed as part of the Relay and Fuse Coordination Study to incorporate changes designed to protect main transformer feeders. It is planned to obtain additional information on emergency line from the 184 Building during power trip-off tests.

An appropriation request, material request, and purchase requisitions were prepared to obtain funds and get material for the geared limit switch installation in the 105 Building.

Design Change No. 255-H was completed during the last outage. The purpose of this design change was to remove the redundant undervoltage contacts from the safety circuit system. This will help prevent spurious scrams and reduce maintenance to the system.

Materials for the necessary changes to the helium and CO_2 piping system are beginning to arrive from the vendors at such a rate that it is estimated that all will be on hand next month.

Since removal of the thermocouple duct from the rear face at the 105-H Building, it will be necessary to install new screens and guards over the exhaust openings at the base of the reactor. Sketches of the required screens will be prepared.

Measurements were taken of the 105-H Building charge and discharge elevator drive components to determine a method of providing remote lubrication of the drive and support chains. This study will continue with preparation of sketches and cost estimates.

Preparatory work for KAPL-120 startup work is progressing satisfactorily, except for heat exchanger remote valve operators. It appears, based on projected startup date of February, 1960, that all maintenance work will be finished with the exception of the three new check valves. These items have an eight-month delivery time and cannot be counted on for startup.

Central Maintenance Operation

A. Engineering and Planning

A clamp to hold a process tube while inserting a broach has been designed which will indicate when a torque of 30-foot pounds, which is the desirable pressure, has been reached.

A gun designed to form process tube Van Stones was demonstrated satisfactorily. It was recommended that one be purchased if it could meet safety requirements.

Special specifications and plans were drawn up for the removal of a highly radioactive and contaminated thimble from a test facility in the 105-H Building.

The sheetmetal craftsmen were given a special training session on the work involved in installation of equipment for Design Test 1050.

B. Shops

The hot shop repaired the following: 500 caps, 21 splitters, 23 broaches, 48 cap inserts, metalizing a shaft for a 200 Area motor which was hot, and overhauling two whirley pumps. Fabrication work was performed in all shops in connection with Projects CG-706, CG-707, CG-817, and MJA-8. A special thermocouple train for Research Engineering Testing was fabricated. Two tube positioner thimbles and shaft sleeves were metalized, a pump impeller assembled, and eight charging machine index assemblies were fabricated and assembled for K. Protective screens for the basin in B and horizontal control rod band seals for H were fabricated, as well as an air duct for K and discharge funnels for D-DR. The installation of the new valve test bench in the shop was completed, and the program for reclaiming valves was started.

C. Projects and Special Services

Projects active in the field for the month were: CG-666 - B and C; CG-706 - B, D and DR; CG-707 - D, C, F, and H; CG-806 - B and H; CG-817 - B, C, F, H, and KE. Painting activities for the month completed the quarterly schedule in KW, and started in B and C. Sign work for K Area was followed up. Protective screens in the 105-B basin were installed. Preliminary work in connection with Design Test 1050 was performed in F and B. The flashover protection modification for electric motors at KW was started. Relocation and wiring revisions for a portion of the Fire Alarm System for B was completed.

E. J. Filip
Manager
H REACTOR OPERATION

EJF:JGM:ore

KE-KW REACTOR OPERATION MONTHLY REPORT SEPTEMBER, 1959

I. ORGANIZATION AND FUNCTIONS

No change

II. PERSONNEL

A. Force Summary

	August 31			September 30			Net Change of Total
	E	NE	Total	E	NE	Total	
General	4	2	6	4	2	6	0
KE Processing Oper.	16	42	58	15	43	58	0
KW Processing Oper.	14	39	53	15	39	54	+1
Power Oper.	11	72	83	11	72	83	0
Maintenance Oper.	25	124	149	24	123	147	-2
Supp. Crews Oper.	10	56	66	10	56	66	0
TOTALS	80	335	415	79	335	414	-1

B. Movement of People

Within KE-KW Reactor Operation, R. L. Gridley, Specialist, Reactor Operations, KE Processing, assumed the duties of Supervisor, 100 Operations, Supplemental Crews Operation. C. L. Stairet, Supervisor, 100 Operations, Supplemental Crews Operation, assumed the duties of Specialist, Reactor Operations, KE Processing. W. J. Gartin, NPR Project Operation, was appointed Manager, KW Processing. G. W. Wells, KW Processing, was transferred to H Reactor Operation and was temporarily assigned as Acting Manager, H Power Operation. W. R. Moon, K Maintenance Engineer was transferred to the Instrument Development Operation, Facilities Engineering Operation. H. C. Sittig, Specialist, Reactor Operations, KE Processing, was transferred to the Computing Operation, Production Operation. H. C. Harrison, New Hire, assumed the duties of Assignment Supervisor, KW Processing.

Changes for the month included three transfers in, three transfers out and one termination.

III. PERSONNEL ACTIVITIES

Representative J. Westland, member of the Joint Congressional Committee on Atomic Energy, made a tour of K Plant facilities.

R. C. Thiel attended an ISA conference and exhibit in Chicago, Illinois and also visited with officials of the Panellit Incorporated, Skokie, Illinois.

J. P. Jones of Travelers Insurance Company made a third-party inspection of miscellaneous pressure vessels in the 1706-KE KER Buildings.

IV. SAFETY AND SECURITY

Eighteen medical treatment injuries were experienced.

The K Plant Safety Council developed a program to emphasize driver safety. A reaction testing device was made available for safety meetings. Component representatives from "B" shift were appointed to serve for the next six months.

No security violations were incurred.

V. NON-ROUTINE REPORTS

None

VI. COMPONENT ACTIVITIES

GENERAL

A. Administration

During September the HOO-AEC Labor Standards Board approved seven jobs for assignment to plant forces which are estimated to cost $57,433. Since the procedure for obtaining LSB approval was initiated in IPD, 177 jobs have been approved, representing a total cost of $7,344,536.

The first of two information meetings to present K Plant's Nuclear Safety Review was held.

The initial session of a series of five scheduled to study Effective Communications was held. R. J. Bursey was course leader.

F. M. Stratton, R. L. Olsen and F. A. Silva completed the Reactor Processing Fundamentals training course for Engineering personnel.

Suggestion Plan Statistics for the month were as follows:

Suggestions at start of month --	61
Received for evaluation --------	15
Replies submitted -------------	15
On hand at end of month --------	61

Assistance was given the Manager, Supplemental Crews in the re-assignment of 28 processing operators within IPD Reactor Operations.

B. Cost Activities

A detailed review of scheduled Planned Maintenance jobs and essential material usage was made to determine the expenditure pattern for the remainder of FY-60. Details were submitted to the Financial Operation.

A list of proposed items was compiled for the PA&C, Planned Maintenance and the Equipment Not Included in Construction Budgets for FY-61 and 62. Reason sheet preparation on approved items was initiated.

C. Landlord Activities

The initial phase of the FY-60 exterior painting program was completed.

Arrangements were made with C. E. Lange for inspection and repair of the 105-KW roof by Minor Construction personnel.

Seven excavation and core drilling permits were issued.

KE PROCESSING OPERATION

A. Production

Input production was 118.4 per cent of forecast. Power level was limited by the rupture control tube power.

B. Operating Experience

1. Operating Continuity

Reactor outages totaled 85 hours. Operating continuity was affected by the following events:

Day	Hours	Remarks
1	2.6	Extention of the August 29 outage.
7	63.4	Rupture in tube 0778. Processed 363 tubes. The poison outage was extended due to a process tube leak and a 190 pump failure.
8	0.6	Panellit scram during start-up.
11	0.5	Scram caused by failure of KER Loop 1 heat exchanger inlet temperature monitor.
29 (to month end)	17.9	Scram caused by fuel element failure in KER Loop No. 3. The outage was continued into October for metal processing.

2. Equipment Experience

a. Instrument and Circuitry - The lower half of the temperature monitor was out of service for nine hours due to loss of regulated voltage to the system. The B-1 and B-2 voltage controllers to the power supply were repaired returning the system to normal.

b. Process Water System - A water leak was detected after start-up on September 8. During the following poison outage, tube 0749 was found to be leaking and was replaced. The Number 5 high lift pump required replacement of a shaft sleeve during the poison outage. The leaking tube and the pump failure delayed start-up by 19.3 hours.

During a complete front face survey to determine the pigtail condition, 121 pigtails were found to have one or more broken strands in the outer layer of the metal mesh.

c. Ruptures - One rupture, KII-N meterial in AX-8001 F can with a mixer slug, was discharged from tube 0778.

d. KER Facilities - Loop 3 was charged with tube-and-tube elements on September 7. One of these elements (1P-250-A) failed and scrammed the reactor on September 29. The loop was recharged with dummies.

C. Improvement Experience

1. Production and Process Tests

Thirteen tubes were charged with production test material at month end.

D. Radiation Experience

1. Radiation Occurrances

There were two Lapses of Radiation Control. One involved the storing of plastic enclosed contaminated tools in the maintenance shop. No contamination spread resulted.

2. External Exposure Control

Maximum personnel dose rate of 3 r/hr were encountered while removing the quickie funnel from a rupture tube.

During graphite stringer installation work, maximum dose rate to personnel while removing the spiral shielding piece was 250 mr/hr at ten feet.

At the time of the Loop 3 rupture, the background radiation level in cell Number 3 of 1706-KER was 150 mr/hr. The reading decreased to 25/hr in approximately two hours. Maximum radiation level on Loop 3 piping was greater than 500 r/hr. The dose rates on all piping and equipment returned to near normal within twenty-four hours.

3. Contamination Control 1706-KER

The lagging below the leak in the REP facility was contaminated to 5 rad/hr including 200 mr/hr. The flange was repaired at a dose rate of 160 mrad/hr. The lagging was removed for burial.

KW PROCESSING OPERATION

A. Production

Input production was 136.1 per cent of forecast as a result of a twenty-six day operating period. Power level was limited by the planned power increase program. A new high level, 60 units above the previous high was achieved.

B. Operating Experience

1. Operating Continuity

Reactor outages totaled 86.6 hours. Operating continuity was affected by the following events:

Day	Hours	Remarks
1	62.8	Completion of outage initiated on August 31.
30 (to month end)	23.8	Scheduled metal processing outage extending into October.

2. Equipment Experience

a. Instruments and Circuitry - Process Change Authorization 9-126 was placed into effect to replace Number 9-81 that expired during the month. The authorization permits use of the vertical Panellit coordinate light system. Under Design Change Number 323, "Pressure Monitor Coincident Scram Circuit-KW Reactor," 58 new Panellit gages were installed in row Number 44.

b. Vertical Safety Rods - Functional drop time tests were conducted. All rods functioned within Process Standard limits. Can-enclosed seals were installed on all but two VSR's to date. Revisions of four rods as authorized by Design Change 228, "VSR Exhaust System Revisions," were begun.

c. Rear Face Crossheader Expansion Joint Failures - Two failures, the fourth and fifth at KW Reactor occurred and were discovered after shutdown on September 30. Plans were made to replace the defective joints on the far side of rows 30 and 44 during the October portion of the month end outage.

d. Graphite Stack - Horizontal traverses of tubes 1345 and 1397 were conducted as part of the planned program to monitor further stack movement at the K Reactors. Preliminary information indicated some movement in these tubes since the measurements taken in November, 1958.

C. Improvement Experience

1. Production and Process Tests

a. PITA-IP-8-I, "Charging KIII Fuel Elements Into K Reactors" - A total of 2,024 KIII N and 339 KIII E metal loadings has been charged into KW Reactor to date. Nine tubes remain with KII loadings.

b. PT-IP-128-CE, Supplement C, "Poison Spline Flexible Control System Tests at K Piles" - During the month, 22 solid splines were inserted into process tubes and 15 were removed for control purposes. Some difficulty was experienced during spline insertion due to cap misalignment. The twenty-six day operating period was aided by the use of splines.

c. PT-IP-240-AE, "Flux Monitoring System Tests at KW Reactor" - The flux wire monitor installation was completed. Approximately 15 flux traverses were taken and only minor operating problems were encountered. Development is in progress to provide automatic controls for the equipment.

2. Projects

a. CG-791, "Reactor Containment" - The rear face installation of Fog Spray, Phase I, was completed.

D. Radiation Experience

1. Radiation Occurrences

There were two Lapses of Radiation Control involving, (1) skin contamination and (2) contaminated tools in the Maintenance shop.

2. External Exposure Experience

The maximum personnel dose rate encountered was 2.5 r/hr for leak testing in the ball 3X tunnel. Gas activity up to 2 rads/hr was encountered on an initial rear face entry for a poison discharge.

3. Contamination Control

During spline removal operations, the "C" elevator floor became contaminated up to 3 rads/hr. Decontamination efforts were successful.

Portions of the exhaust fan room were released to normal status following decontamination. The residual contamination levels have existed since the brief uranium fire in April.

KE-KW POWER OPERATION

A. Operating Experience

The HAPO Electrical peak was controlled at 331.0 megawatts until September 18 when it was reduced to 327.0. Maximum generation required for the revised peak was 3 megawatts. Excess loading of generators for peak demand control was required for a total of 14 hours.

B. Equipment Experience

After the September 8, KE Reactor startup the outboard packing Gland on the November 5 high lift pump began leaking excessively. During the poison outage, inspection revealed that the metalizing on the shaft within the packing gland had broken loose from the shaft. The pump impeller and shaft were pulled and a new shaft sleeve was installed. Reactor startup was delayed 0.8 hours by the pump difficulty.

Fly wheel cooling water coils were replaced on the Number 2 and 3, 190-KE high lift units due to leaks.

C. Improvement Experience

1. Projects

The Byron Jackson Company began the casting of a new impeller incorporating design changes that are expected to reduce the cavitation rate experienced by the prototype pump unit now in operation. Completion and procurement time was estimated as three months.

Development test 1P-282-E (CG-775 Capacity Test of Number 8 filter, 183-KE) was initiated on September 22. The filter effluent controls were set to produce a minimum flow of 7.5 gpm/sq. ft. and a maximum of 8.0 gpm/sq. ft. The test continued through month end.

KE-KW MAINTENANCE OPERATION

A. Equipment Experience

1. Instruments

Range changes were made to 1,117 Panellit gages. In 105-KW, fifty-eight dual trip switch panellits were installed on row Number 44 as provided by PT No. 1P-266-B to evaluate 2B Contact Type Magnetic Mercury Switches.

Sections Number B1 and B2 of the temperature monitor power supply failed in 105-KE causing one-half of the automatic temperature monitor to become inoperative. Tubes were replaced and insulation was repaired, returning the unit to service.

2. Electrical

a. Lighting - Lighting fixtures were modified in the metal storage room in 105-KE to clear a loaded transtacker. The two channel light assemblies in the 105-KW pickup chutes were revised to facilitate relamping thereby reducing radiation exposure to craftsmen.

b. Generators - Plastic covers were installed over all the pilot exciters in 165-KW and over Number 3 generator in 165-KE.

3. Mechanical

a. Pressure Vessels and Relief Valves-KE - A survey was made to determine compliance with code. Several modifications were recommended.

b. Effluent Line 105-KE - The gasket in the top flange of a Dresser coupling began leaking. The line was excavated and temporary repairs made.

c. Wire Flux Monitor - The single wire system installation was completed in 105-KW.

B. Engineering

1. Inspections and Evaluations

a. Mattress Pads-105-KW-KE - An inspection revealed that the pads have significantly deteriorated after ten months use. A study of the problem was continued.

b. VSR Gas Seals - Three seals composed of two types of material and in use since January of this year were inspected. The seal of GE 450 silastic had a cracked lip. Seals of D.C. 916 material showed evidence of wear and were reinstalled for further testing.

c. High Lift Pump Motors-190-KE-KW - The planned tests of T-948 grade brushes were completed. A report of test data and the sample brushes were forwarded to the Carbon Products Division of General Electric Company for evaluation. The results indicate that T-948 grade brushes are less satisfactory than the T-869 grade. To date, T-869 grade brushes have given satisfactory performance.

d. Flywheel Cooling Tubes - The failure at an increasing rate of the water-to-air cooling tubes, primarily on the high lift pump flywheels, prompted a request for assistance from Metallurgical Engineers John Fox and A. McDonald. Samples of tubes and water analysis data were sent to General Engineering Laboratories in Schenectady for further evaluation. Two new tubes of copper-nickel alloy were ordered as replacement material oil cooler of the 181 pumps.

2. Design Changes

The following design changes were completed and routed for approvals:

a. Design Change 317 - Riser Pressure Switch Replacement

b. Design Change 319 - HCR Withdrawl Upon Loss of Cooling Water

c. Design Change 315 - Pressure Monitor Trip Identification

3. Procedures and Check Sheets

The following PM procedures were completed:

a. Electrical Inspection of Vertical Safety Rod System

b. Electrical Inspection of 105-Building Air Supply System

c. Electrical Inspection of the HCR Danger Zone Equipment

d. Class "A" and "B" Inspection of Liquid Rheostats and Control Equipment

e. Electrical Inspection of Low Lift Pump Motors and Controls

f. Electrical Inspection of 181 River Pump Motors and Controls

C. Planning and Scheduling

1. Class "A" overhauls were completed on 144 items of equipment and class "B" on 256 items. The class "A" overhauls included the glycol pumps and motors in KW, the glycol motors in KE, Number 3 high lift pump in 190-KW and various other pumps. The "B" overhauls included the glycol pumps in KE and Number 3 boiler in 165-KE.

SUPPLEMENTAL CREWS

A. Events Influencing Costs

1. Supplemental Crews Time Distribution

The non-exempt time distribution from August 31 through September 27 was as follows:

Area	Percent	Hours	Area	Percent	Hours
100-B	11.10	824	100-F	15.32	1148
100-C	15.40	1159	100-H	24.20	1820
100-D	4.80	352	100-KE	13.06	977
100-DR	3.32	247	100-KW	12.80	958

Manager
KE-KW REACTOR OPERATION

RSB:GEG:ced

[redacted]

PRODUCTION OPERATION
SEPTEMBER, 1959

I. ORGANIZATION AND FUNCTIONS

No change.

II. PERSONNEL

A. Force Summary

	August 31			September 30			Net
	Ex.	N.E.	Total	Ex.	N.E.	Total	Change
General	2	1	3	2	1	3	0
Prod'n Rpts. & Statistics	1	2	3	1	2	3	0
Prod'n Planning and Sched'g	5	4	9	5	4	9	0
Prod'n Computing	2	3	5	3	3	6	+1
Essential Materials	1	1	2	1	1	2	0
	11	11	22	12	11	23	+1

H. C. Sittig, Specialist, transferred from KE Processing Operation to a position as Programmer, Computing Machines.

III. PERSONNEL ACTIVITIES

Nothing to report.

IV. SAFETY AND SECURITY

There were no injuries or security violations. Safety and security meetings were attended as scheduled.

V. NON-ROUTINE REPORTS

Doc. No.	Title	Author	Date	Class.
HW-62051	Unscheduled Reactor Outages	R. E. McGrath	9/23/59	Secret

VI. FUNCTIONAL ACTIVITIES

A. Production Planning and Scheduling Operation

1. Forecasting

Work continued on evaluating assumptions for the 18-month forecast to be issued during October, 1959.

2. Production Scheduling

a. Discharge Concentrations

Several goal exposure adjustments have resulted from a decision to pilot higher power levels at certain reactors without increasing total uranium requirements. Below is a list of changes put into effect by the end of September to implement this decision.

(1) B, D, DR, H — I & E regular slug goal raised from 700 MWD/ton to 725 MWD/ton.

(2) F — I & E regular slug goal lowered from 740 MWD/ton to 620 MWD/ton.

(3) KE — I & E regular and enriched slug goals raised from 650 MWD/ton to 700 MWD/ton.

Other goal exposure adjustments resulted from better than expected metal performance and were:

(1) C — I & E enriched slug goal raised from 650 MWD/ton to 700 MWD/ton.

(2) KE — I & E enriched slug goal raised from 575 MWD/ton to 700 MWD/ton.

(3) KW — I & E enriched slug goal raised from 575 MWD/ton to 650 MWD/ton as a result of compensating effects; the improved metal performance discussed above versus an increase in operational severity. This severity increase explains the difference in I & E enriched goal exposures between KE and KW Reactors.

The following table gives the revised goal plan for all reactors:

Variable Goal Discharge Plan

Material	Reactor(s)	I	M	*G Max-MWD/T	**Usual Dischg. Exposure - MWD/T
Solid Regular	B,D,DR,F,H,KE,KW	1000	440		725
Solid Regular	C	1000	550		650
I & E Regular	B	1400	550	900	725
I & E Regular	C	1400	660	900	675
I & E Regular	D	1400	570	900	725
I & E Regular	DR	1400	580	900	725
I & E Regular	F	1400	660	900	620
I & E Regular	H	1400	600	900	725
I & E Regular	KE	1500	700	900	700
I & E Regular	KW	1500	740	900	650
Solid Enriched	B,DR,H	1800	1160	1000	850
I & E Enriched	B	2100	1030	1600	900
I & E Enriched	C	1900	1050	1600	700
I & E Enriched	D	2100	1030	1600	825
I & E Enriched	DR	2100	1050	1600	950
I & E Enriched	F	2100	1030	1600	950
I & E Enriched	H	2100	1050	1600	1000
I & E Enriched	KE	1900	970	1600	700
I & E Enriched	KW	1900	1030	1600	650

* Where low tube powers would result in discharging well above the economic upper limit, a maximum goal has been specified.

** The exposures of individual batches can vary widely from those listed because of timing of the outage and/or the powers of the tubes discharged.

NOTE: The I and M constants are used to determine the goal to be assigned to each tube using the equation:

$$G = I - Mf$$

where: G = Goal exposure in MWD/ton
I = Variable goal intercept
M = Variable goal slope
f = Relative tube power

The amount of material discharged outside the established goal plan continued low as shown in the table below:

Below Goal Discharging - September, 1959

Reactor	Tons Disch.	Tons Excess Usage	Material Type	Reason
C	1.0	0.4	Enriched	Discharge of supporting enrichment for special depleted material (PT IP-231A) which was discharged.
D	0.4	0.3	Regular	To permit charging of swelling capsules (PT IP-227A) in optimum location.
F	0.9	0.4	Regular	Process tube replacement.
H	1.7	1.1	Regular	Charging of the fringe E-N load under PT IP-255.
	1.3	0.6	Enriched	
KE	1.0	0.4	Regular	Temporary poison.
KW	0.6	0.3	Regular	Tube traverses to monitor graphite stack movement.
	4.0	2.2	Totals for Regular	
	2.3	1.0	Totals for Enriched	

A comparison of September discharge exposures for each metal type with data for previous months is as follows:

Comparison of September Discharge Exposures (MWD/T)

	Regular U		Enriched U	
	Solid	I & E	Solid	I & E
July	727	728	1068	693
August	757	743	953	824
September	741	745	904	772

b. Off-Plant Shipments

Four casks containing 6-7 tons of I and E special depleted slugs irradiated under the High Pu-240 program were shipped to ORNL for separation.

c. Polonium Program

The FY 1960 polonium commitment was increased from 30,000 curies to 63,500 curies with the requirement that 19,000 curies be shipped in October. All available irradiation space not loaded with production material was pressed into service on a temporary basis to meet the October request. In addition, six tubes of regular production material were displaced in favor of this program.

3. Operations Analysis

Unscheduled reactor outages and production efficiency received major attention in an analysis of reactor performance. Work continued on the overall process tube corrosion and water leak problems from the standpoint of up-dating information prior to compiling and issuing a five-year tube replacement forecast. Evaluation of a depleted loading to obtain plutonium high in the 240 isotope for the Hanford Laboratories Operation was under study at month-end.

B. Production Computing Operation

Tube-by-tube source data were processed to establish the current production and corrosion status for each tube in all reactors. Routine and emergency reports were issued to implement the scheduling, forecasting, and accountability functions of the Production Operation. Charge-discharge and tube replacement information for each reactor operation was provided in accordance with production schedules.

Production data were supplied to each Pile Physicist for reactivity evaluations, and to Process Technology for EDPM processing.

Individual tube source data were supplied to the SS Accountability Operation for calculating weights of SS material in discharges and month's end inreactor inventories.

Following a recommendation made by the Plant and Industrial Engineering Operation, reactor charging sequence listings for the pre-insertion of dummies are now being issued in balanced near and far sections. The dual listings separate tubes to be charged on each row into two equal parts so as to equitably divide the work load between two teams of operators.

C. Production Reports and Statistics

Routine processing of the Daily Production and Daily Operations Reports and the monthly Manufacturing Section Record Report was continued. Data involving reactor operation and associated equipment were collected and tabulated in historical record books. A chart book was maintained for the HAPO General Manager and preparation of chart books for the IPD General Manager and Manufacturing Section Manager were started. A large volume of both routine and non-routine data were supplied to IPD personnel. Some routine data were also supplied to the FPD, CPD and HLO.

D. Essential Materials

Rail and truck shipments received in September were as follows:

Carload shipments for IPD	200
Carload shipments for other Depts.	112
Truck shipments for IPD	171
Total	483

Helium consumption during the month of September in all reactors was as follows:

100-B	237,000
100-C	356,000
100-D	97,000
100-DR	147,000
100-F	183,000
100-H	90,000
100-KE	202,000
100-KW	203,000
Total	1,515,000

In addition to the routine duties involved in the procurement and delivery of essential materials, the following item was included in the group's activities during September:

1. Prepared a letter to Purchasing outlining IPD's requirements of liquid aluminum sulphate for calendar year 1960. A new contract will be negotiated for this material.

E. Miscellaneous Activities

Security classification matters continued to be handled for the department. New guidance from the AEC-HOO and the Hanford Laboratories Operation was given appropriate distribution and interpretation within IPD. Special liaison with HLO continued in connection with revision of the Hanford Classification Guide as required to update and improve its coverage of production-related topics, and to include the New Production Reactor topics. Discussion topics illustrating IPD problem areas in classification administration were developed for use by HLO and AEC-HOO representatives to an AEC-DOC meeting in Washington, D. C. in early October.

Consideration was given the possibility that a group from S. Savannah deck officers might come to Hanford later this fall for training in IPD's reactor operations.

Arrangements for the new program for giving reactor Utility Operators supplementary classroom training in reactor fundamentals were completed, and the Fall Series of these classes started on Sept. 18. Forty such operators (about half the present total) are enrolled in this Series.

Liaison continued with O. S. Hulley, Consultant - Mfg. Training & Education in GE's New York office, and plans were firmed for his visit to HAPO on Oct. 6-8. Advance information relating to the Company's Manufacturing Training Program and associated Manufacturing Studies course was obtained and distributed within IPD and to other interested HAPO components.

As a basis for planning an integrated broad program for the training of Manufacturing Section personnel, a survey of total training needs was initiated.

C. A. Priode, Manager
Production Operation

CAP:DLD:bam

MONTH
September, 1959

REACTOR OPERATIONS STATISTICS – PROCESSING

	B		C		D		DR		F		H		KE		KW		TOTAL	
INPUT PROD.–Pu (% OF FORECAST)	106.1		85.6		119.2		117.3		100.4		106.7		118.4		136.1		114.1	
TIME OPER. EFF. (% OVERALL)	83.3		65.4		94.3		94.4		70.5		83.4		88.2		88.0		83.4	
NO. OF REACTOR OUTAGES & HOURS	NO.	HRS.	NO.	HRS.	NO.	HRS.	NO.	HRS.	NO.	HRS.	NO.	HRS.	NO.	HRS.	NO.	HRS.	NO.	HRS.
SCHEDULED	-	31.7	-	192.6	-	32.8	-	25.8	-	103.0	1	107.1	-	48.9	1	83.7	2	625.6
UNSCHEDULED – SCRAMS	3	88.6	3	4.6	1	6.5	3	1.5	2	22.4	-	-	3	3.0	-	-	15	126.6
– OTHER	-		2	52.2	-	1.5	1	12.9	2	86.9	-	12.3	1	33.1	-	2.9	6	201.8
TOTAL	3	120.3	5	249.4	1	40.8	4	40.2	4	212.3	1	119.4	4	85.0	1	86.6	23	954.0
BREAKD'N OF REACTOR OTGE HRS.																	TOTAL HRS.	TIME
PLANNED																		
CHARGE–DISCHARGE		16.5		39.8		21.3		11.6		34.0		36.1		35.9		43.0	238.2	4.1
TUBE REPLACEMENT										29.4		21.9					51.3	0.9
PROJECT WORK		3.7		9.4								28.1				17.5	58.7	1.1
PRODUCTION TEST				7.7		2.8		2.0				1.8		10.3		3.2	27.8	0.5
MAINTENANCE		11.5		135.7		8.7		12.2		39.6		19.2		2.2		18.9	248.0	4.3
MISCELLANEOUS														0.5		1.1	1.6	0
SUB – TOTAL		31.7		192.6		32.8		25.8		103.0		107.1		48.9		83.7	625.6	10.9
UNPLANNED																		
CHARGE – DISCHARGE						1.5				2.5		2.3					6.3	0.1
PRODUCTION TEST				2) 34.4										2.4			36.8	0.7
RUPTURE REMOVAL								12.9						11.1			24.0	0.4
WATER LEAK										64.2				18.5			82.7	1.4
MAINTENANCE		1) 88.6		17.0						25.8		10.0		2.4		2.9	146.7	2.6
INSTRUMENTATION				0.4				0.4									0.8	0
PANELLIT				4.2		6.5		1.1						0.6			12.4	0.2
MISCELLANEOUS				0.8						16.8				1.1			18.7	0.3
SUB – TOTAL		88.6		56.8		8.0		14.4		109.3		12.3		36.1		2.9	328.4	5.7
TOTAL		120.3		249.4		40.8		40.2		212.3		119.4		85.0		86.6	954.0	16.6
NO. SLUG RUPT. (ALL TYPES)				1				1						1			3	
NO. NEW TUBES INSTALLED								1		21		14		1			37	
TYPE OF WATER LEAK – TUBE								1		3				1			5	
VAN STONE																		

REMARKS:

1) Cleaning rubber particles from screens.
2) Includes 30.9 hrs. for removal of a stuck Production Test rupture.

DECLASSIFIED

[redacted] Ch-1 [redacted]

MONTH: September, 1959

REACTOR OPERATION STATISTICS – SLUG RUPTURES

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	
I&E Reg.	0778-KE	Hole failure	11.1	2-28-59	9-7-59	845	KK-090-D		X			
I&E Reg.	1689-DR	Side other	12.9	5-30-59	9-14-59	632	KL-195-D			X		Leaker
I&E Dep.	1081-C	Unclassified	30.9	11-24-58	9-17-59	1151	PT-IP-231-A				X	
30" Tube-and Tube	3565-KE	Loop #3	9.6	9-7-59	9-30-59	252			X			

Ch-2

DECLASSIFIED

HW-62184

MONTH: September, 1959

REACTOR OPERATIONS STATISTICS — POWER

SHEET 1

		100-B	100-C	100-D	100-DR	100-F	100-H	100-KE	100-KW	TOTAL
RIVER WATER (BLDG.181)										
TO RESERVOIR (BLDG.182)	GPM AVG.	15630		4375		2409	3535			25949
TO FILTER PLANT (BLDG.183)	GPM AVG.	64383		95303		68689	76300	163200	167600	635475
TO FILTER PLANT (C&DR)	GPM AVG.	90413		65090						155503
TO R & E (KER) FEO	GPM AVG.			203				615		818
TOTAL	GPM AVG.	170426		164971		71096	79835	163815	167600	817745
TOTAL	M GAL.	7362.4		7126.7		3071.3	3448.9	7076.8	7240.3	36326.4
RESERVOIR WATER (BLDG.182)										
TO POWER HOUSE (BLDG.184)	GPM AVG.	20		55		366	41			482
TO COND.SYSTEM(BLDG.190)	GPM AVG.	3000		1620		1815	3494			9929
TO COND-SYSTEM (190DR & 183F)	GPM AVG.			2700		228				2928
TO EXPORT SYSTEM	GPM AVG.	12610								12610
TOTAL	M GAL.	675.2		189.0		104.0	152.7			1120.9
FILTER WATER (BLDG. 183)										
TO POWER HOUSE (BLDG.184)	GPM AVG.	216		223		158	178			775
TO PROCESS (BLDG. 190)	GPM AVG.	76390	66719	78816	79241	66362	71700	159903	164350	763481
TO 108	GPM AVG.	2100	5000	242		1155	1250			9747
TO 108DR	GPM AVG.			241						241
TO FILTER PLANT (BLDG. 183DR) and B	GPM AVG.		(15725)	(14151)						(29876)
TO F & S SYSTEM	GPM AVG.	186		237		218	157		50	848
TO R & E (KER) FEO	GPM AVG.			153				5		158
BACKWASH	GPM AVG.	1216	2969	1240	(691)	796	3015	3292	3200	15728
TOTAL	M GAL.	3460.6	3905.8	4117.0	3423.2	2967.3	3296.2	7050.2	7240.3	34170.2
PROCESS WATER (BLDG. 190)										
TO REACTOR	GPM AVG.	75990	66319	78416	78150	65962	71200	156400	159900	752337
TO REACTOR	GPM NOR.	82800	96600	81100	82200	84000	84100	173800	177600	(862200)
POWER HOUSE (K AREA)	GPM AVG.							21	11	32
108 (KE - KW)	GPM AVG.							3012	4039	7051
TO R & E (KER)	GPM AVG.							70		70
BUILDING USAGE	GPM AVG.	400	400	400	400	400	500	400	400	3300
TOTAL	M GAL.	3300.0	2882.2	3404.8	3393.3	2866.8	3097.4	6907.8	7099.9	32952.5
RIVER DATA										
ELEVATION (MSL,FT.)	(MAX.)	393.8		384.7		371.2	376.9		388.3	
	(MIN.)	390.0		380.6		367.8	373.7		383.5	
	(AVG.)	391.8		383.0		369.3	375.2		386.0	
TEMPERATURE	AVG. °F	64.0		64.0		65.3	64.2	64.5	62.6	

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HW-62184 C

MONTH
September, 1959

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			197.8		104.0				301.8
BLDG. 183	MM GALS	2781.3	3905.8	4117.0	2811.8	2967.3	3296.2	7050.2	7240.3	34170.2
CHEMICAL CONSUMPTION										
CHLORINE (BLDG.182)	LBS.					400				400
(BLDG.183)	LBS	15526	26914	27860	18770	18881	23195	50000	59700	240846
	AVG PPM	.6	.8	.8	.8	.8	.8	.9	1.0	.8
ALUM	LBS	94995	105183	174980	109400	137847	171125	328900	289500	1411930
	AVG PPM	4.1	3.2	5.1	4.7	5.6	6.2	5.6	4.8	5.0
SEPARAN	LBS									
	AVG PPM									
SULPHURIC ACID (As 100%)	LBS	166886	289813	267432	158451	187056	189659	464000	446700	2169997
	AVG PPM	7.2	8.9	7.8	6.8	7.6	6.9	7.9	7.4	7.6
DICHROMATE	LBS	50600	42333	51020	50830	43504	45040	101600	103800	488727
PURGE MATERIAL CONSUMPTION										
SOLIDS	LBS	0	550	0	0	0	0	0	0	550

BM-5700-024 (9-58) AEC-GE RICHLAND, WASH.

MONTH: September 1959

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	8.00	7.90	8.39	8.39	8.35	8.22	7.56	7.55
TURBIDITY	PPM AVG	2	3	3	3	4	3	4	4
FINISHED WATER									
pH	pH AVG	7.10	7.10	7.06	7.04	7.03	7.07	7.07	7.08
TURBIDITY	PPM AVG	.005	.004	.005	.004	.006	.005	.005	.005
Cl_2 RESIDUAL	PPM AVG	.05	.05	.10	.09	.06	.09	.05	.05
DICHROMATE	PPM AVG	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8

STEAM DATA		100-B	100-D	100-F	100-H	B-D-F-H TOTAL	KE	KW	KE-KW TOTAL
GENERATED (MAX)	LBS/HR	147000	136000	105000	76000	464000	47000	74000	121000
(NOR)	LBS/HR	120000	120000	78000	72100	390100	-	-	-
(AVG)	LBS/HR	106300	117331	76317	68200	368148	32119	31306	63425
TOTAL	M LBS	76589	84479	54946	49139	265153	23126	22540	45666
TO PLANT	M LBS	64947	71638	48353	41670	226608	20813	20286	41099
COAL RECEIVED	TONS	1600	3265	2898	3428	11191			
CONSUMED	TONS	5176	5630	3278	3091	17175			
IN STORAGE	TONS	26748	30543	15811	18078	91180			
GEN. STEAM/LB. OF COAL		7.39	7.50	8.38	7.95	7.72			
OIL RECEIVED	GALLONS						686110	17413	703523
CONSUMED	GALLONS						222598	214855	437453
IN STORAGE	GALLONS						1281840	755286	2037126
GEN. STEAM/GAL. OF OIL							103.9	104.9	104.4

ELECTRICAL DATA			
TOTAL GENERATED KW HRS.	1500800	1528800	3029600

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HW-62184

FACILITIES ENGINEERING OPERATION
MONTHLY RECORD REPORT

SEPTEMBER, 1959

I. ORGANIZATION AND PERSONNEL

A. Responsibility

There were no changes of assigned responsibilities during the month.

B. Personnel Statistics

	Aug. 31, 1959	Sept. 30, 1959	Net Change
Employees on Permanent Roll	173	174	+ 1
Technical Graduates (Rot.)	10	10	0
Technician Trainees	2	2	0

	FEO	Technical Graduates Rotational
Transferred into Operation	8	0
Transferred out of Operation	2	0
Payroll Removals	5	0

C. Personnel Changes

Charlotte C. Dowda, Secretary, was placed on the rolls with Reactor Modification Design on September 21, 1959.

Frances L. Bennett, Steno-Typist, Plant and Industrial Engineering, terminated on September 8, 1959.

J. D. McCullough, Engineer, Equipment Development, transferred to NPR Project Section on September 1, 1959.

E. D. Crump, Engineer Designer II, was placed on the rolls with Plant and Industrial Engineering on September 3, 1959.

R. P. Withycombe, Summer Employee, Plant and Industrial Engineering, terminated September 11, 1959.

Bonnie S. Merrill, Secretary, Reactor Modification Design, terminated on September 11, 1959.

C. Dupree, Instructor-Craft Practices, Plant and Industrial Engineering, returned from a leave of absence on September 14, 1959.

G. T. Purcel, Summer Employee, Equipment Development, terminated on September 14, 1959.

Rosa S. Fortenberry, Secretary, Equipment Development, terminated September 18, 1959.

Ruby C. Middlebrough, Secretary, was placed on the rolls with Equipment Development on September 14, 1959.

Virginia D. Bischoff, Secretary, Management, transferred to Research and Engineering on September 28, 1959.

W. R. Moon, Engineer, transferred from KE-KW Reactor Operation to Equipment Development on September 15, 1959.

M. P. Johnson, Engineer, transferred from H Reactor Operations to Plant and Industrial Engineering on September 15, 1959.

Betty H. Grilly, Secretary, was placed on the rolls with Plant and Industrial Engineering on September 25, 1959.

C. J. Crane, Service Manual Writer, transferred from F Reactor Operation to Plant and Industrial Engineering on September 9, 1959.

D. Personnel Development

No courses were offered.

E. Safety and Security Experience

No medical treatment injuries were reported.

No security violations were reported.

II. MONTHLY REPORT OF INVENTIONS OR 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 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.

"A Roller Type Process Tube Flanging Tool," E. Hollister, 9-2-59.
"A Remote Controlled Drive for Automatic Sampling Devices," E. Hollister, 8-14-59.
"A Pneumatic Process Tube Inserter," E. Hollister, 8-14-59.
"A Cartridge Type Process Flanging Tool," E. Hollister, 9-11-59.
"Automatic Clutch," R. B. Willson and C. E. Frantz, 8-27-59.

III. ACHIEVEMENT

A. Reactor Modification Design

1. Research and Development

The downcomer model test program at Washington State University continued during the month with efforts concentrated on the short term tests in support of the proposed 105-DR downcomer modifications. At month's end these tests have been essentially completed. The proposal for the performance of the model studies in support of the bulk temperature increase program was received from Washington State University during the month. Arrangements are being made for funding. Additional security clearances for Washington State University personnel were requested during the month to permit the continuation of the test program under the security classification assigned to the test data. The reports of the previous phase of this test program were received and issued during the month.

Progress on the study of existing reactor backup systems was limited during the month to a review of the earthquake vulnerability of the present backup system with representatives of Holmes and Narver, Incorporated. A request has been issued for the performance of specific studies of several of the more critical portions of the process water system in order to determine whether or not any modifications are required.

2. Design Projects

(a) CG-775 - 100-K Area Water Plant Expansion

Agreement has been reached with the manufacturer of the prototype 190 Building process pump modification, the Byron Jackson Company, that a new high lift pump impeller will be furnished for testing to determine if the cavitation condition noted in the present impeller can be corrected. Fabrication of this new impeller, which has a reduced eye diameter, has been started.

Approval of the decision by the Project Representatives to increase the design objective of this project from 175,000 to 188,000 gpm (five pump operation) has been received from HOO-AEC. The preparation of scope material is continuing, with electrical, instrument, and filter plant modification scope drawings issued for comment.

A review of the items which will be included in this project is under way in an effort to achieve a reduction in the estimated project costs.

The capacity test of the 100-K, 183-K filter plant was initiated during the month, with the objective of demonstrating the feasibility of operating at filter flows of 7.6 gpm/ft^2 on a routine basis and the development of a shorter automatic filter backwash cycle.

(b) CGI-791 Reactor Confinement

The preparation of detail design for Phases I and II of this project have been completed. The preparation of Phase III detail design is continuing as additional items of scope definition are established. The design criteria for Phase III has been completed and issued for comment. The preparation of supporting scope drawings for the criteria is continuing. Study results indicate that new exhaust fans will be required in 105-K and DR and that the fans in the other areas may be modified. A new detail design schedule is being prepared to reflect the additional items included in the Phase III scope.

The overall completion of the supporting development and testing program is eighty per cent with actual testings started for all tests but the Environmental Component tests and the Halogen Collector Program.

Additional test runs have been made in the ORNL Irradiated Uranium Oxidation Test Program. It was found that the combustion of irradiated uranium in pure oxygen resulted in the release of a voluminous number of particles on the order of 0.005 microns in diameter. A summary report of the test results obtained to date is being prepared.

The analytical study of reactor incidents and the proposed confinement system performance has been completed and issued. The information in this analysis was used as a basis for the ventilation and building sealing portions of the Phase III scope. The study of alternate halogen collection systems has also been completed and issued. The study of sealing of the existing reactor building has been completed in rough draft form and is

being reviewed prior to issue. Several alternate materials to the specified plyon for sealing the filter building duct work are being evaluated. Testing of reactor building wall and roof sections has been completed except for shear strength tests of transite walls.

At month end, seals for use in the filter frame seal test have not been received. Difficulty is being experienced by the vendor in the extrusion of the specified material in the required seal configuration. The use of alternate materials is being evaluated. The environmental test units have been marked up and calibration testing completed. Installation of the test assemblies is held up pending the availability of reactor outage time.

An interim report has been received on the accelerated filter life loading tests. The test results indicate that optimum filter life will be obtained by the use of two absolute type filters in series and that filter lives in excess of two years should be achieved.

All equipment has been received and is being installed for the Halogen Collector Test Program being performed by the Arthur D. Little Company. A total of eight absolute filters were shipped from HAPO for use in this test program. Upon receipt of the filters, five were found to have suffered hidden shipping damage in addition to two activated charcoal units and one molecular sieve which were also damaged. Replacement filters have been procured for use in the test program. Attention is being given to the problem of filter damage in the procurement of the filters for use in the filter building. Initial equipment shake down tests are scheduled for early in October.

(c) CGI-839 KER Loop Conversion

Detail design on this project is continuing and is 24 percent complete as compared to a scheduled 33 percent. The principal cause of delay is the lack of vendor information regarding all pumps and heat exchangers. The procurement specification for the loop pumps has been completed and forwarded for procurement action. Final detail design drawings of the process tube assemblies have been issued for comment. Design test requests for testing of the process tube assemblies have been completed and issued.

A review of the feasibility of providing flywheels on the loop pumps has been made. Available date indicates that flywheels are not required to permit switching

from one electrical supply bus to the other. Provisions have been made to permit the later addition of flywheels to mechanically sealed loop pumps for special high flux fuel element tests.

Negotiations by HOO-AEC for the selection of an Architect-Engineer to prepare detail designs for the hot maintenance and decontamination shop are continuing. A firm has been selected and final contract discussions are under way.

(d) CGI-844 100-K Area Backup System

Consideration has been given by the Design Council to several alternative backup systems which might be included within the scope of this project. Among the various systems considered were a steam turbine driven emergency pump, a high tank on the HPCT, the installation of a new HPCT in parallel with the existing system and an emergency pumping station located midway on the existing HPCT. The Design Council concurred in the decision of the Project Representative that the proposed 4160V electrical crosstie and the steam crosstie line should be deleted from the scope of the project.

In order to provide additional information to aid in selection of the various alternatives to be included in this project, further studies have been undertaken. The data obtained from these studies will be submitted for Design Council consideration.

(e) MJA-18 100-K Graphite Restoration

Progress on this problem has been delayed pending the receipt of the ceramic HCR sleeves and the accumulation of data from the pile motion indicator installed at 105-KE last month.

3. Visitors

Mr. Richard W. Hyde and Frank C. Schora of the Arthur D. Little Company, Cambridge, Massachusetts visited HAPO September 29 and 30, 1959 to review progress on the Halogen Collector Test Program and discuss decontamination procedures.

Mr. Robert A. Williamson, Mr. Richard E. Lowe, and Mr. Kelly McBean of Holmes and Narver Incorporated visited September 23 and 24 to discuss earthquake studies of the existing reactor plants.

4. Trips

D. F. Watson visited Solar Aircraft Corporation - San Diego, California August 30 to September 1 to discuss the use of small gas turbines as an emergency power source.

N. F. Fifer visited Washington Stage University September 15, 21, 23, and 24 and D. F. Watson visited Washington State University September 21 in connection with McIlroy network analyzer studies of the 100-K process piping system.

M. H. Schack visited Washington State University September 11 to review progress on DDR-41, the Downcomer Model Testing program.

5. Significant Reports Issued

HW-60997 - "Project CG-775 Representatives Meeting No. 4 - June 16, 1959", H. W. Heacock, September 28, 1959 Secret.

HW-61793 - "Development Test Authorization IP282-E Project CG 775, Capacity Test of 100-K Water Plant Filters" N. F. Fifer, September 8, 1959, Unclassified.

HW-61852 RD - "Project CGI-844 100-K Coolant Backup Representatives Meeting No. 1, August 26, 1959", D. F. Watson, September 10, 1959, Secret.

HW-61899 - "Reactor Confinement Representatives Meeting No. 11 August 28, 1959", E. L. Etheridge, September 14, 1959, Unclassified.

HW-62024 - "Classification Criteria - Contract DDR-41", N. F. Fifer, September 22, 1959, Confidential-Undocumented.

B. Equipment Development

The prototype traveling wire flux monitor installation was completed and demonstrated at 105-KW. The first charts obtained from eight test runs in tube 3069 KW indicated that the machine can fulfill its purpose of providing accurate front to rear flux distribution information while the reactor is operating.

The bids for the cap remover system (105-KW) were received from four potential vendors. Since the low bid was in excess of authorized funds, a revised project estimate was obtained and action initiated to restudy incentives, redetermine customer requirements and explore Company and AEC attitude toward additional funding.

In view of the extremely high bid by General Mills for the 105-KW Cap Remover a review of the Remote Manipulator specifications and cost quotation (by General Mills--1958) was undertaken. A visit was set up to discuss the matter with General Mills personnel. Results of this action will determine the method of proceeding toward the procurement of a remote manipulator for test and evaluation of remote maintenance functions.

The testing of operational charge-discharge prototype equipment at 105-C was limited by component malfunction and repair and by operational conditions at the reactor. Three metal charges were removed and replaced. It was jointly agreed with Manager "C" Processing that the ball valve pattern would be reduced from 111 tubes to 24 tubes at the convenience of Operations.

Preliminary conceptual engineering study was initiated or continued on (1) an overthrow toggle method for effecting rear nozzle closure remotely, (2) a simple rear closure design involving the principle of displacing a cap rearwards under remote control, and (3) an evaluation of a fundamental concept of effecting charge-discharge while operating through a hydraulic system utilizing tube inlet pressure for actuations.

On September 3, one hundred and fifty gunbarrel bellows at 105-C were filled with silicone foam. The equipment for piercing the bellows cover and bellows worked satisfactorily. The foaming machine functioned satisfactorily during the filling of the 150 gas seals. A meeting was held with B-Operations to delineate the course of future work.

Work is progressing on the development of a sector probe to inspect the top wall of the process tube. A dummy prototype probe was constructed and was found to traverse the process tubes easily while maintaining a vertical position (Mechanical Development B). A probe insertion gun was also fabricated. A prototype probe is forecast to be ready early in October.

Examination of the experimental subcritical neutron monitor at 105-D was partially disassembled showing no signs of wear or corrosion. The assembly was thoroughly cleaned, lubricated and reinstalled.

Two phase critical flow tests were initiated during the month. Low pressure tests indicate the need for additional instrumentation. Revision to the test equipment is underway.

Design Test 1045, "NPR Process Tube Deflection and Insertion" was completed during the first week of September, 1959.

The Daystrom two-channel flow monitor prototype has shown a trip point repeatability of ± .14 percent. No drift in trip point setting has been distinguishable. The stability of the trip level is such that there is an area of dwell of 0.28 percent. These tests were made over a period of four weeks.

Preliminary evaluation of the Century Electronics dynamic visual monitor for use in rod position instrumentation indicates that lamp life (100 hours) is too short. Lamp life could be increased by decreasing voltage on the lamps. However, the intensity of the lamp is already much too low for proper viewing of information in a room with 90-100 foot candles of light.

Instrumentation to be used in the fuel rupture experiments at ETR loop at Arco was shipped to Arco last week. The first in-loop experiment is expected to be run the first week in October. Work is progressing on installation of a 100 point gross gamma 6-M tube-count rate meter, magnetic amplifier type fuel rupture monitor at C Area in order to determine the long term reliability of this approach. It has been determined that the short term operation of the equipment is such that a fuel rupture can be adequately detected when the rupture supplies in the order of 15 mr/signal.

Visitors

Mr. H. Bazar of Hydro-Air, Inc., Burbank, Calif., visited Mechanical Development "A" on August 27, 1959 to discuss ball valve requirements.

Mr.M. Smith of Automated Controls Company visited Instrument Development on September 10, 1959 regarding the possible use of miniaturized electronic modules in future instrument developments.

Mr. B. Jones visited HAPO and Instrument Development on August 18 and 19, 1959 to discuss flow monitor transducer and flow monitor development as related to NPR requirements.

Messers. A. D. McLeod, J. W. Mace, and R. W. Wells of the Marine and Industrial Supply Company, Inc., Seattle, Wash., visited Materials Development on September 16, 1959 to discuss the application of coating materials to the test site at 212-P.

The following representatives of Wyandotte Chemicals Corp., Wyandotte, Mich., visited Materials Development on September 23, 1959 for discussions on reactor decontamination: Messers. H. Suter, P. N. Burkard, W. George, J. Schneider, L. Wagner, and D. H. Tuel.

Trips

E. Hollister on August 16 to 22, 1959 visited Winchester Arms Company in New Haven, Conn., to discuss development problems in connection with the explosive vanStone flanging tool, and to discuss and observe alternate control techniques and equipment for work area crane improvements at the Whiting Corp., in Harvey, Ill., the Shaw-Box Division in Muskegon, Mich., and the Harnischfeger Corp., in Milwaukee, Wis.

C. W. Botsford visited Norfin, Inc., and Western Gear Company in Seattle, Wash., on August 8 to 11, 1959 to discuss design development contract, and on September 9 to 11, 1959 visited and consulted with Arthur Forsythe Company, Columbia Geneva Steel Company, of Seattle, Wash., and United Products of Tacoma, Wash., on graphite channel overboring.

C. W. Higby visited Boeing Airplane Company, Seattle, Wash., on September 3 to 7, 1959 to consult on mechanical seal development.

D. F. Arnold and R. Sherrard visited Epsco-West Company in Anaheim, Calif., on August 30 to September 2, 1959 to witness test of replacement analog to digital converter, Purchase Order H9P-39283.

E. C. Wood on September 21 to 25, 1959 visited General Mills, Inc., Minneapolis, Minn., to review details of the remote manipulator estimates previously prepared, and the General Engineering and Manufacturing Services Laboratories in Schenedtady, N.Y., to explore the desirability of utilizing their services for development package assignments.

Significant Reports Issued

Undocumented	"Report on Trip to Olin-Mathieson, Ramset Division on Metal Forming by Powder Actuated Tools," J. W. McLaughlin, 8-31-59.
Undocumented	"Trip Report - Discussion of NPR Piping Problems and Attendance of Seminar on Strain Gages," J. H. Fastabend, 9-1-59.
Undocumented	"Trip Report - Discussions Pertaining to Mechanical Seals and Valves for NPR, " C. W. Higby, 9-11-59.
Undocumented	"Status Report - NPR Fitting Development Activities," J. H. Fastabend, 9-15-59.
Undocumented	"Dielectrics and Electrical Insulating Qualities Affecting Their Use in Radio," R. S. Hammond, 9-10-59.
HW-61847	"Final Report - 107 Basin Sealing Method," J. P. Cooke, 9-11-59.
HW-61903	"CG-666, Zone Temperature System Reliability Analysis," G. Swezea and R. Sherrard, 9-14-59.

C. Plant and Industrial Engineering

1. Drafting Operation

Summary of Drafting Operation services provided is:

New, revised, as-built drawings	169
Sketches, layouts and charts	127
Microfilm drawings added or retired	2300
Film Prints Produced	183
Check Prints Produced	966
Customers Serviced Print Files	275
Catalogs Added	88
Customers Serviced Catalog Files	57

The remodeling work on the area drafting offices was completed. These offices now have ventilation, lighting and general appearance equal to or better than other HAPO drafting installations. These badly needed improvements have had a marked effect on the moral of area drafting personnel. Efforts are now underway to improve equipment used in these offices.

2. Industrial Engineering

Rear Face Improvement, All 105 Buildings

Material handling equipment required for improving charge-discharge activities on the rear face of 105-KE, KW, has been partially reviewed. Arrangements are being made to install these conveyors during scheduled October outages.

A successful test was conducted at 105-DR utilizing the same type of material handling equipment. The results of this test were reviewed with the Processing and Supplemental Crews Managers at their September 10, meeting. The plan was accepted by them. An Appropriation Request is being prepared to procure the necessary equipment for 105-B, C, D, F and H and some replacement equipment for 105-DR.

Water Leak Study 105-F

While assisting F Processing on water leak problems, it was found that there is a measureable current flow from the process tubes to the front face shield during reactor operation. No current could be measured when the reactor was shut down. The measurements that have been made to date which seem to be reproducible, suggest that the magnitude of current flow may reveal a rate of external process tube corrosion. Further exploratory work will be done to evaluate this theory.

Rear Face Setup and Buttonup Activities - D-DR

Operating crews were specially trained by Industrial Engineering Operation in the uses of engineered methods prepared for the subject tasks. The crew performed perfectly on the August 25, outage and proved the engineered methods to be correct. The use of the new methods reduced the time required for setup and buttonup activities by a factor of 2 as predicted.

Charge-Discharge Operation Study, 105-C

As requested by C Processing management, analysis of charge-discharge was furnished. On the last two similar charge-discharges, 105-C has made a 27 percent improvement (a 21 percent reduction) in overall charge-discharge time. Improvement in setup time of 2 hours, 49 minutes was effected with the use of engineered methods. The rate in which caps were taken off increased from 2.5 per minute to 5.4 per minute. Improvement in the basic charge-discharge phase of 5 hours, 24 minutes was accomplished with improved manpower scheduling and with the use of engineered methods.

Program of Charge-Discharge Improvement

Work area and "C" elevator charge-discharge procedures have been completed. During the analysis, it was discovered that a significant difference exists between the various types of charging machine heads. The pneumatic head now being used on some of the machines reduced coupling and uncoupling time and allows a charging rate of 58 tubes per hour instead of the 53 tubes per hour rate for the other types of heads.

3. Standards Engineering

Productive Maintenance

Third Party Inspections of elevators and unfired pressure vessels were made in IPD plants on September 16th and 17th, 1959. Fifty seven unfired pressure vessels and one process elevator were covered.

Correct running clearances were established for rubber bowl and line shaft bearings for the 181-F pumps. Sufficient bearings were ordered from the vendor to permit complete replacements in three pumps. Upon receipt of these bearings, purchasing inspector service was requested. It appears we have been successful in obtaining clearances and tolerances closer than these previously available from the manufacturer of this equipment.

Spare Parts

Stores Stock Requests processed		5
Stock Adjustment Requests processed		31
Maximum Authorized dollar value of new items added by SARs	$14,227	
Maximum Authorized dollar value of spare equipment requested by letter to Project Engineering	0	
Maximum Authorized dollar value of spare parts requested for Projects by SARs	6,903	
Number of Engineered spare parts items reviewed		42
Number of Drawings ordered revised		4
Maximum Authorized dollar value of items deleted from Spare Parts stock	7,125	

Quotations were received on spare stator coils for the 4500 HP process pump motors. Thirty two coils were placed on order without winding supplies. No winding supplies will be ordered until the overall need for these has been further evaluated.

Engineering Standards

The guide for maintenance work on code piping has been completed and the sketches have been reproduced. Report has been reviewed by D-DR Maintenance personnel with no comments, and is being issued.

Craft Training

The twelve IPD Instrument Trainees were individually interviewed, and their formal education and instrument experience background were reviewed. The resulting information compiled in a composite form will be used as a guide in formulating the Instrument Trainee Training Program. Supervisors of the Trainees received an Instrument Experience and Rotation Record Book for each trainee, with instructions covering the use of the book.

An Instrument Service Manual, prepared by W. D. Hamilton, B-C Maintenance, on the Foxboro Dynalog Recorder was published and distributed to the IPD Instrument Maintenance Shops, and the engineers.

4. Water Plant and Utilities Engineering

Engineering in Support of Power Forecasting

The HAPO power demand was coordinated through study, with the operating schedules. At mid-month it was found that the control point could be substantially lowered without excess generation and this was done. Additional loads due to lower river levels, electric heating, and 300 Area projects were found to be diversified with respect to IPD operating schedules this month.

Coal Utilization Standards

S. J. Aresco, from the Bureau of Mines at Pittsburg, was conducted through the plant power houses. The purpose of this visit was to be advised by him on problems involved in maintaining control of coal quality. Discrepancies in ASTM standards for coal sizing were discussed and action initiated to resolve these discrepancies.

Weller Reed, Consulting Mechanical Engineer and Steam Power Plant Specialist inspected the 100 Area power house and water pumping facilities, and made a preliminary study of operating conditions. Special tests were conducted during this preliminary study. The consultant will outline a comprehensive test which will be performed during October in 100-H.

River Temperature Control by Dam Regulations

Control of the dam for cooling purposes ceased on September 28, 1959. The control period lasted from August 11, until September 28. The river was maintained at a temperature no higher than 19.5°C and continuous forecasts were supplied to reactor operations to permit maximum utilization of the water temperature control program. Average reductions of 2½°C were maintained during the controlled period.

100-F Outfall Line Repair

An inspection of the interior of the 1904-F outfall structure revealed open joints where the outfall lines join the 1904 structure and deep cracks in the walls of the concrete structure. Since the outfall lines were too hot thermally to enter, no inspection of the lines has been possible to date. It is not known at this time whether the water causing the river bank springs is entirely from outfall lines. No breaks were visible in that portion of the line that could be seen from the outfall box.

It is planned to uncover the lines at least at one location - about half way between the outfall structure and river edge in order to better determine the condition of the lines prior to the outage and repair work.

107 Basin Modification Program

A draft of the latest revised scope for B effluent system modifications was prepared, based on the use of 107-B basin as a catch basin for diversion only when necessary to drain the 107-C tanks to the crib. The scope estimate for this proposal is $520,000. Details of the flow diversion system are still being resolved with the assistance of Construction Engineering Operation and B-C Reactor Operation.

4500 HP Motor Drives

Tests of 4500 HP stator and stator coils conducted during the month in an effort to find a technical explanation for the motor failures experienced to date. These tests were conducted on used coils, new coils in Stores stock, and on a spare stator at 189-F. Further analysis of the oscillograph traces from the B-C tripout test were also concluded. The magnitude of the neutral shift does not appear to be great enough to cause coil failure.

The General Engineering Laboratory is continuing work to evaluate both failed and unfailed coils forwarded from Hanford. These tests include both voltage breakdown of selected coil segments, micro examination of insulated components for continuity and porosity and exhaustive examination of copper segments in place.

5. Reactor, Plant Engineering

Gamma Monitor - 105-H and Other Areas

Heat exchanger drawings were issued for construction for 105-H. 105-H Maintenance is proceeding with procurement for installation. Compilation of justification for project action in older areas continues.

Closed Circuit Television

Demonstrations of prototype equipment were completed by a showing to Reactor and FEO Management on September 11, 1959. Perkins and Elmer, Bausch and Lomb, and Wallensack have been contacted to determine feasibility of applying a Zoom type lens to the optical scanner.

Noise Problem, 105-H Fresh Air Compressor

Noise from the fresh air compressor at 105-H presented a problem in using adjacent space for offices. Installation of a resonator in the system reduced the sound pressure level by approximately sixty percent.

Noise Problem, Coal Car Shakers

Prints have been provided "F" Power Operation showing recommended modifications for protecting personnel from shaker noise.

105-C Annex - Heating and Ventilation

Recommended heating and ventilating equipment modifications and additions to improve personnel comfort were issued as a report titled, "Ventilation - 105-C Metal Examination Facility", dated August 28, 1959. These recommendations have now been accepted and funds were approved to effect the changes.

Rear Face Connectors

A joint report of recommended action was issued on September 16, by Mechanical Development "A" Operation and Reactor, Plant Engineering Operation to provide engineering advice on correcting the failure hazard of old-style rear face pigtails at B, D, and F reactors. The modified J connector with O-rings on the tubing, rather than in the adapter, is considered as the proper replacement unit for interim service prior to planned major modifications of rear face piping. It was recommended that F Area replace connectors immediately. B and D areas have been requested to remove additional pigtails for inspection. Failure of the O-rings in the J type rear connector assemblies at 105-H is continuing to be a problem. Arrangements have been made to measure the relative vibration between the "J" connector and its adapter during reactor operation. This work is being done in support of Mechanical Development study of the problem.

Charge Seater

Prints for the ram-type seater have been revised to production model status. The new charge seaters received limited use in the last unscheduled F outage since both of the new overhead carriages were not installed. Good performance was demonstrated by the seater which was used.

Heat Treating Facility - 1717-H

Drawing H-1-12072 - Explosion Alarm System was approved for construction and issued. Consultation continued for pressure testing and pre-startup testing.

Transfer Area Hoist Shaft Failure - 105-H

Inspection of a Failed Transfer Area Hoist shaft from 105-H revealed the cause of failure to be improper heat treatment of the shaft material. An acceptable material was recommended for the replacement shaft.

6. Trips

W. W. Windsheimer made a trip to Schenectady, New York, to consult on several plant engineering problems.

H. A. Kramer made three trips to Coulee Dam during the month.

R. T. Jaske and H. A. Kramer traveled to Trail British Columbia to investigate river temperature control with Canadian Utilities.

R. T. Jaske made a trip to Minneapolis, Minnesota and Evanston, Illinois, for the purpose of engaging consultants for the Columbia River model activity.

A. McDonald made a trip to Schenectady, New York, to review progress of the General Engineering Laboratory test on the coils and to obtain recommendations for substitute materials for the K motor gear coolers.

L. C. Cole traveled to Rochester and New York City, New York, to contact numerous vendors regarding an optical scanner that will be required for the closed circuit television system.

7. Visitors

W. L. Shannon, Senior Partner of Shannon & Wilson, soil mechanic and foundation engineers, visited Hanford on September 22, in order to provide consultant advice on 181 pump house foundation and ground water problem.

Mr. Weller Reed, Power Consultant of Los Angeles, California, spent the week of September 14 thru 18 at Hanford to familiarize himself with Hanford equipment in order to make recommendations regarding boiler operating levels.

Walter L. Taylor, District Representative of the Electric Storage Battery Company, spent September 14 and 15 at Hanford assisting in the rehabilitation of storage battery installation.

8. Significant Reports

HW-61442, "Saving Chemical Costs in the 100 Areas - Scope and Justification", by J. C. Baudendistel.

Study of 1706-KE and KER Equipment Reliability as it Effects Safety and Operating Continuity of the KE Reactor, September 15, 1959, LP Reinig et al.

Report on "Instrument Calibration Service and Instrument Pool", TM Clement, dated September 22, 1959.

D. Project Engineering

1. Projects

Number of Assignments	Description	Balance
18	Active Construction Projects	$5 999 300
4	Active Expense Jobs	566 800
6	Completed Projects - Accrued	1 936 900
	Plant Assistance	54 400
	Customer Work Orders	61 100
	Total	$8 618 500

CG-558 - Reactor Plant Modifications for Increased Production

Pump Test Stand

Contract work is essentially complete. Mounting bases for pump gear case have been set. All piping has been installed and heat treating has been essentially completed.

Process Water Pumps

Arrangements have been made with DeLaval's Field Engineer, Mr. Ed Budde, to arrive on site October 5, 1959 for supervision of the remaining pump modification work.

An inspection was made of Unit No. H-8 to determine the cavitation attack on the PW-1417-2 impeller in the high suction pressure area. Minor etching is indicated after approximately six month's operation; therefore, final evaluation will not be possible until the unit has operated approximately one year. It should be noted that this condition represents a very significant improvement over any previous impeller design after six month's of operation.

CG-674 - Water Plant Component Test Loop, Building 1706-KE

As previously reported various repairs were in process to the loop which had to be completed before the ATP could be completed. Repairs were completed and the loop was started on a test run September 25. At this time the loop was operated at design pressure and flow. The running of the ATP was discontinued because of a leak which developed in the rupture disc assembly. This is being repaired to permit completion of the ATP.

CG-707 - Improvements to Reactor Nuclear Instrumentation in Reactors

Previously reported was the installation of one channel of the system at 105-B on August 27. Since then the first channel has been installed and is operating at 105-F (September 13), and at 105-H September 25. In all cases the equipment is operating as expected.

CGI-791 - Reactor Confinement

Phase I - Fog Spray

All areas now have manually operable fog spray systems. Total work is 88 percent complete.

Certain of the instrumentation for automatic operation has not been shipped from the vendor's plant; therefore, it appears that completion date of November 15 cannot be met without special reactor shutdowns to allow final installation and testing. If present vendor promises slip it would be impossible to complete the work by November 15 even with special outages.

Phase II-A - Site Preparation

J. A. Jones forces have started concrete work on ducts in 100-KE. Site preparation work is progressing satisfactorily in all areas and is approximately 32 percent complete.

Phase II-B - Lump Sum Contract

Bid packages were mailed out by the AEC Contract Section on September 29. Scheduled opening date for bids is October 28, 1959.

CGI-802 - Process Safety Monitoring System, High-Speed Scanning Type for Temperature Monitoring

As previously reported Epsco, Inc., of Boston was awarded the contract to furnish a 116 point high speed scanning demonstration system. Several HAPO engineers have traveled to the Epsco plant for a review meeting on this equipment. The meeting, starting September 28, is expected to be completed on September 30.

CGI-817 - Crossheader Pressure Differential Indicators and Alarm Systems, Hanford Reactors

Installation of differential pressure indicators, front and rear face sensing lines, support brackets, and valves were completed at 105-B. These indicators are now ready for use without the alarm system.

CAI-831 - Fence and Badge House Relocation - 100-F Area

The lump sum contract being performed by the Howard S. Wright Company of Seattle is approximately 55 percent complete. The badge house has been poured and is in the process of interior finishing. Installation of the light poles is approximately 85 percent complete and the perimeter fence is approximately 65 percent complete.

2. Project Proposals

CGI-791 Rev. 3	Reactor Confinement
CGI-871	Improved Dummy Decontamination

Project Returned Unapproved

CAI-868	Columbia River Scale Model

Project Proposals Submitted

CG-674 Rev. 4	Water Plant Component Test Loop, Building 1706-KER
CGI-861	Expansion of Electrical Distribution System, 105-B, D and F

Other Projects Awaiting AEC Approval

CAI-835	Additional Office Space
CGI-839 Rev.1	Modification of Fuel Element Test Facilities, 1706-KER
CGI-844	Coolant Backup, 100-K Area (Interim Authorization of $30,000 received July 20, 1959)
CGI-869	Operational Charge-Discharge, C Reactor

Requests Received for Project Preparation

CGI-824 Rev. 1	Remotely Operated Cap Remover, KE Reactor
CG-775 Rev. 2	Water Plant Expansion, 100-KE and KW Reactors

MANAGER
FACILITIES ENGINEERING

RT Jessen:mbs

RELATIONS PRACTICES OPERATION
SEPTEMBER 1959

PERSONNEL PLACEMENT

Eleven experienced BS/MS candidates were interviewed during the month with eight IPD offers extended. There were three acceptances and no rejections, leaving five offers open at month's end. There were two PhD candidates interviewed during the month with no offers extended. We have one previous PhD offer open at month's end.

There were six exempt transfers into the Department from other HAPO components and one transfer into the Department from the Silicone Products Department, Waterford, New York. There were two transfers out of the Department; one within HAPO, and one to APED, San Jose. One non-exempt employee was upgraded to exempt status. One exempt employee was reactivated and five summer employees terminated.

OFFICE SERVICE

IPD components were surveyed to determine their interest in the new course, "Seminar in Executive Decision-Making" which is scheduled to start October 12. Four participants (the Department quota) were selected, and necessary background data was furnished to Education and Training on October 2.

The names of eighty-nine exempt employees were submitted to Education and Training as possible participants in "Principles and Methods of Supervision and Leadership". Since many of those expressing a desire to take the course are shift workers, it has been requested that the course schedule be arranged to accomodate all shifts.

COMMUNICATION

Mass communication activities included the publication of nine "Management News Bulletins, one Round Table Guide, three IPD Employee Headliners, and three priority messages. GE NEWS coverage included 17 items about IPD activities totaling 254 column inches, or 39% of all available space. Two Management Information Meetings were held during the month.

An article by our Communication Specialist entitled "Communicating with Shift Supervisors" was accepted for publication in the October issue of "Manage" magazine.

SALARY ADMINISTRATION

The main activity within Salary Administration, aside from routine items, included preparation of salary administration data on all exempt employees of the Department for inclusion in the annual Company compensation study as of October 1,1959 to determine Company average position level, percentage of position rate, and similar bench marks. In addition, Department temporary promotions of non-exempt craftsmen to supervisory positions for vacation and other relief periods during 1958 and 1959 were summarized to permit study of over-all Department practices in this field.

WAGE & BENEFITS

During September, IPD paid a total of $170 in suggestion awards to 20 suggesters for a total of 19 new suggestions. The highest award was $25.00

The Good Neighbor Fund Campaign for HAPO, will be conducted during the week of October 5. A total of 636 employees are presently nonparticipants representing 29.4% of IPD's work force.

One IPD employee died on September 12. Roy E. Thomas, Sr., a Millwright Journeyman in D Area died of a heart ailment.

Four IPD exempt employees were granted tuition refunds for completion of work related courses completed during the summer quarter 1958-59 at the University of Washington Center for Graduate Study.

HEALTH & SAFETY

There were no disabling injuries reported in September. This extends our injury-free days to 198 during which we have accumulated 2,350,000 hours of exposure. There was a drastic reduction in medical treatment injuries. A study of this situation is being undertaken to determine the significance of this performance.

Two security violations, one in R&E and one in 100-F, were reported, the first since July. A total of 22 for the year; three less than in 1958.

An explosive flanging tool, designed by FEO, was introduced for testing and use by maintenance personnel. Following its introduction, Health & Safety personnel were invited to inspect the tool. The findings resulted in a mutual agreement to take the tool out of service and to seek new design.

A study of better methods of handling, fitting and care of plano-type safety glasses is in progress. This is being conducted in all 100 areas in conjunction with First Aid Stations participating in the handling of this equipment. The purpose is to encourage more employees to protect their eyes where they are subject to the hazards of our type of operation.

E. F. Fitzmaurice

FINANCIAL OPERATION
MONTHLY RECORD REPORT
SEPTEMBER, 1959

General Accounting

Starting September 28, 1959, Vendor Inspection services performed by General Electric will be charged directly to projects affected, rather than General Construction Indirect. This change will result in a reduction of the percentage liquidation rate of General Construction Indirect from 5% to 3-1/2% effective same date.

A preliminary meeting with Kaiser Engineers, NPR Project Section and IPD Financial was called by AEC for the purpose of establishing the responsibilities for NPR Project funds, cost accounting, cost reporting and authorities for work to be performed by HAPO components.

A physical inventory of precious metals was taken on September 30, 1959. No significant discrepancies were noted.

Product Cost and Budgets

The essential material procedure for taking physical inventories was revised to change the schedule to the 25th day of each month. This will aid operating people in scheduling their inventories and will result in earlier reporting.

A schedule of UO_3 Credits compared to amounts paid for machined slugs for the last 3 years was prepared.

Procedures

Procedures were developed and installed in the department for new business and technical data processing applications. An OPG on this subject was issued.

In conjunction with Facilities Engineering, Research and Engineering, and Data Processing personnel, extensive explorations were made concerning the possibilities of applying process control computers in our business. Contacts are now being made with technical experts and manufacturers of this type of equipment.

Auditing

The inventory of precious metals taken September 30 by General Accounting was observed.

A tentative audit schedule for the period 9-1-59 through 8-31-60 for the department was prepared for submission, as part of the HAPO schedule to the Atomic Energy Commission.

Five proposed HAPO Organization and Policy Guides covering Property Management, were reviewed and comments for the Department were submitted.

Timekeeping checks made during the month showed little variation between gate house registrations and time card entries.

General

No inventions or discoveries were reported during the month by Financial personnel.

Carl Reed

for Manager-Finance
IRRADIATION PROCESSING DEPARTMENT

DR MacNaughton:kd

MONTHLY RECORD REPORT
NPR PROJECT OPERATION
SEPTEMBER, 1959

I. ORGANIZATION AND PERSONNEL

A. Responsibility

There has been no change in responsibilities since last month's report.

B. Personnel Statistics

	August 31 1959	Sept. 30 1959	Net Change
Employees on Permanent Roll	68	72	+4
Technical Graduates (Rotational)	1	3	+2
Technical Trainees	0	0	0

	NPR	Technical Graduates (Rotational)
Transfers into Operation	8	3
Transfers out of Operation	1	1
Payroll Removals	3	0

C. The following personnel were added to NPR Project during the month:
To Field and Operations Engineering:
J. E. Stice, Supervisor, Pile Erection Engineering;
M. G. Little, Senior Pile Erection Engineer;
F. D. Collins, Fabrication Shop Engineer;
H. G. DeVoss, Senior Reactor Engineer NPR;
R. V. Moore, Field Clerk;
Juanita Myers, Secretary.
To Process Design:
D. D. Stepnewski, Engineer, Reactor Design Analysis;
J. D. McCullough, Engineer, Reactor Plant Design;
Tech. Grads. K. D. Coughren, A. R. Gottschalk and R. A. Hemphill.

The following personnel left NPR Project during the month:
Professor D. E. McFeron, summer employee;
W. J. Gartin, transfer to KW Processing as Manager;
G. J. Scoggin, draftsman, to return to college;
Darvis Richardson, leave of absence.
S. L. Stewart, Tech. Grad, on rotation.

D. Safety and Security

New fire wardens for the building were appointed and all building occupants were instructed regarding their safety in the event of fire. No medical treatment injuries were reported during the month.

No security violations were reported during the month.

II. MONTHLY REPORT OF 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.

III. ACHIEVEMENT

A. Process Design

1. Research and Development

For most of the month, effort was expended on study of methods to improve the quality of data and the coverage of the instrumentation for the high pressure process tube rupture test program. A single simulated rupture test was performed late in the month with 750°C graphite temperature and water at 800 psig and saturation temperature. Stack lifting was considerably greater than previously observed. Since several changes had been made in the test instrumentation, data analysis must await rerun of reference cold tests.

Initial tests were run to obtain basic hydraulic information regarding two-phase flow from a break in a high pressure, high temperature water line. Data are needed to support calculation of the consequences of a primary loop pipe rupture in the NPR. In addition to cold water single phase flow calibration runs, the following simulated pipe rupture tests were performed during the month:

Pipe Size (inches i.d.)	Pressure of Saturated Water Supply - (psig)
1	50,250,500,750,1000,1250,1500, and 2000.
2	50, 250
4	50, 250

Preliminary data appear to be of good quality and in agreement with values calculated by current methods for the conditions of these tests.

During the month, the logic and machine flow diagrams for an IBM-709 Pipe Flexibility Analysis Code to analyze piping arrangements consisting of two anchors and multiple constraints were prepared. Actual preparation of the FORTRAN program has been delayed until the final version of the Heat Transfer Code is completed. This latter program was used successfully in studies of NPR reflector and shield temperatures. As the result of the experience gained in doing these analyses, a number of changes are being made which will permit several cases to be run consecutively with a minimum of data input and will reduce calculation time.

2. Project CAI-816

Four reactor plant criteria were approved during the month by the project representatives, leaving five yet to be processed out of a total of forty-two. Scope design stands at 90 percent complete compared to 83 percent at the end of last month. Four specifications have been approved to date and nine others are out for comment out of an anticipated total of 125. Of the 93 development and testing program items currently scheduled, 18 have been completed, 55 are in progress, and 20 are in the planning stages. Except for the testing program, which is estimated to be 43.5 percent complete against a scheduled 52.0 percent, the current status of all elements of the reactor plant design program is very close to schedule. Final design approval of construction drawings is still behind schedule but considerable improvement has been made. The over-all weighted reactor plant design progress is now 30.7 percent complete, compared to 26.7 percent at the end of last month.

A document describing potential reactor plant cost reduction items was issued for comment during the month.

Brief study was given to the feasibility, cost, and effect on schedule of expanding the scope of the NPR design to include provisions for experimental irradiation facilities. On the basis of the information developed, it was concluded that the schedule delay that would be incurred ($\sim$four months) made such a proposal incompatible with NPR program objectives.

On the heat dissipation system design, scope drawings are estimated to be 56.1 percent and design criteria 47.8 percent complete compared to estimates of 52.8 percent and 40.7 percent at the end of last month. To facilitate progress on the Title I effort which is currently quite critical to the over-all program, the heat conversion plant project representatives convened at the Burns and Roe offices in New York. Material definitive of the scope design for the after heat removal system and the river water pump house was processed in this manner with a minimum of delay.

A meeting was held with representatives of Burns and Roe, and the AEC to discuss details of the main heat exchanger procurement. Agreement was reached that specifications would be revised in regard to head material and temperature transient conditions. It was also agreed that data would be obtained regarding variation of cost as a function of secondary steam pressure (for plutonium only operation) and for alternate heat exchanger tube materials. The Process Design recommendation that the heat exchanger area per loop be increased was re-emphasized at this time.

2. Project CAI-816 (Continued)

An effort was made to prepare detailed interpretive information on NPR classification in an attempt to reduce the penalties in cost, schedule, and quality of engineering currently resulting from the presently inadequate guidance. However, since Process Design already is utilizing all available manpower on an over-time basis, it was concluded that the necessary attention could not be diverted at this time without having a serious impact on design progress.

3. Visitors

G. L. Locke, consultant to this operation, visited HAPO on three occasions during the month for discussion of the process tube rupture test program.

A. J. Loiacono and H. Gitterman of Burns and Roe visited this operation to discuss points to be negotiated with the main NPR heat exchanger vendor.

4. Trips

M. H. Russ spent three weeks at the Burns and Roe offices in New York, in company with the other heat conversion system project representatives, working on early processing of scope design information.

G. E. Wade contacted Dr. C. E. Belke of Oregon State College at Corvallis, Oregon to discuss and observe hydraulic model work being done in support of NPR design.

H. S. Davis inspected a number of possible east central Oregon sources of heavy aggragates for NPR shields.

J. F. Nesbitt visited equipment manufacturers in Seattle and Portland to discuss design aspects of NPR underwater metal handling equipment.

R. A. Rohrbacher attended an Instrument Society of America meeting in Chicago and, on the same trip, consulted with Burns and Roe personnel in New York on NPR instrumentation design problems.

W. D. Bainard visited GE-APED in Vallecitos, California to observe decontamination of VBWR piping.

D. L. Condotta contacted Burns and Roe representatives in New York to review coolant system control design and to discuss the system analysis program.

A. B. Carson visited AEC offices in Washington D.C. in connection with a review of NPR program for the Chairman of the AEC.

5. Significant Reports Issued

HW-57036 RD4 - "Design Criteria - Fission Product Confinement System," September 16, 1959, G. E. Wade.

HW-57044 - "100-N Design Bases - Part II - Functional Requirements of the Primary Loop Control and Instrumentation Systems," September 11, 1959, D. L. Condotta.

HW-57972 - "Heat Conversion Plant Project Representatives Minutes No. 25," September 18, 1959.

HW-57973 - "Heat Conversion Plant Project Representatives Minutes No. 26," September 21, 1959.

HW-57974 - "Heat Conversion Plant Project Representatives Minutes No. 27," September 24, 1959.

HW-61412 - "NPR Process Design Monthly Report - August, 1959," September 10, 1959, A. B. Carson.

HW-61753 RD - "Reactor Cost Reduction Study - 105-N," September 14, 1959, G. E. Wade.

HW-61769 - "Trip Report - Visit to Sheppard T. Powell Concerning NPR Water Treatment," September 1, 1959, W. D. Bainard and W. R. Conley.

HW-61825 - "NPR Project Section Monthly Design Test and Development Program Status Report, " August, 1959, W. J. Morris.

HW-61839 - "Radiation Release and 105 Building Pressures for Project CGI-791," September 18, 1959, D. E. McFeron.

HW-61918 - "105-N Remote Handling Facilities," September 18, 1959, J. F. Nesbitt.

HW-61919 - "Transient Thermal Barrier Temperatures," September 16, 1959, D. E. Sebade.

HW-61925 - "Calculation of K Reactor Flow Decay Transients," September 17, 1959, W. A. Massena.

HW-61966 - "Miscellaneous NPR Data," September 18, 1959, E. R. Astley.

HW-61979 - "Leakage from Zones I and II of 105-N," September 16, 1959, G. E. Wade.

HW-62045 - "NPR Stack Drying and Gas Condenser Capacity," F. J. Mollerus, Jr., September 24, 1959.

5. Significant Reports Issued (Continued)

HWS-6974 RD - "Process Tube Inlet Butterfly Valve and Drive Mechanism," September 3, 1959, W. J. Morris.

HWS-6975 RD - "Process Tube Outlet Diversion Valve and Drive Mechanism," September 3, 1959, W. J. Morris.

B. Development and Testing

Listed below are significant developments for the New Production Reactor as reported by the Equipment Development Operation of Facilities Engineering.

The Component Test Loop was operated on three shifts; tests were scheduled and performed on a priority basis. Process tube rupture test #8 was performed at 800 psi with the graphite at 750°C. Two-phase flow tests through ruptured 1-inch, 2-inch, and 4-inch test sections were performed at 50 and 250 psi, as were 1-inch tests at 250, 500, 750, 1000, 1250, 1500 and 2000 psi. Thermal cycling of three test sections was extended beyond 1400 cycles. The facility to flex fittings during thermal cycling was completed and is ready for use.

Thermal cycling of two Zircaloy-to-stainless-steel rolled joints was completed and the test sections and data were returned to the Canadian General Electric Company. No leakage was detected during the cycling at the test conditions requested. One joint was cycled more than 7000 times and the other more than 3000 times.

Test data were collected on the speed of insertion of hydraulically-activated horizontal control rods as graphite was distorted to simulate 0-5-10-15-20-25 years of contraction. All tests were performed at 2800 psi hydraulic pressure. Qualitatively, total length insertion times increased up to 25 percent from the nominal base of 1.4 seconds.

Instrumentation to be used in the fuel rupture experiments in the ETR have been shipped to Arco. The first in-loop experiment is expected early in October. Parts have been ordered to increase the number of experimental rupture detection channels at C-Reactor from 16 to 100 to determine long-term reliability factors for this gross gamma system (GM tube - count rate meter - magnetic amplifier). Short-term operation of this system has shown that it can detect adequately a rupture giving a 15 mr per hour radiation change.

In flow monitoring, two Luther rotary differential transformers have been received with split output windings such that the high limit function of a flow monitor can be separated from the information circuit.

In ceramic ball development, nine samples of ceramic balls have been ordered from Electric Auto-Lite, five containing various concentrations of europium or samarium and four containing mixtures of europium plus samarium and/or gadolinium. Three samples of ceramic balls containing varying concentrations of boron-ten have been received.

Specifications and procurement procedures to be used in obtaining both prototypic and project quantities of butterfly valves and diversion valves were discussed with Kaiser and all problems resolved.

Samples of equipment and instrument prototypes, applicable to the New Production Reactor, were delivered to the exhibit room being established by the Atomic Energy Commission for the benefit of access permitees.

C. Field and Operations Engineering

1. Activities

Construction

L. W. Vail Company and their sub-contractors have essentially completed placing the base course on the access highway and are now placing the leveling course.

J. P. Head has made the tie-in of the 12" water line to the existing 42" export line and has completed the crossing of the existing main highway. Approximately 2200 lineal feet of 12" steel pipe has been installed and tested.

The Tullar Electric Company has dug all the post holes for the 13.8 kv line from 100-D Area to the job site and has placed the poles along the route of the line.

Graphite

Kaiser Engineers have now assigned one man to initiate engineering work on the 2101 Building fabrication equipment renovation; however, they do not presently plan to start actual renovation work until sometime in November. The precise timing is dependent on progress of negotiations which they have underway with the Union International to establish work assignments.

In an effort to expedite the renovation and modification of the two surfacing mills, representatives of the Sundstrand Corporation were recently invited to visit HAPO. As a result of the discussions held with them by Kaiser Engineers and General Electric representatives, tentative modifications and machining sequences were established for the surfacing operation which is the key process in moderator fabrication.

Due to the relative magnitude of estimated steam costs during the period of graphite fabrication, it has been determined that it will be feasible to meter the total steam consumption to the 2101 Building, with a pro-rated split between General Electric (Construction Engineering and Utilities Operation) and Kaiser Engineers based on comparative usage of ventilation units. Installation of the meter is now in progress.

Zirconium

Fabrication of process tubes by Allegheny-Ludlum Steel Corporation is still being delayed by the steel strike.

Harvey Aluminum has made three extrusions of excellent quality. One has been cut up to be used as evaluation pieces to test the tooling on the cold draw operation. Cold drawing these pieces demonstrated that either a larger draw bench or an anneal prior to the final draw is required. Both approaches are being investigated at this time.

Chase Brass and Copper Company has received and are in the process of installing their new draw bench. They have extruded twenty-five billets and have forged four additional ingots.

The specification for the moderator cooling tubes has been issued for comment. Procurement action for these additional zirconium tubes will be initiated soon.

Administration

The following material was processed by Drawing and Specification Control during the month:

Drawings	159
Criteria	14
Specifications	22
Requisitions	7
ATP's	0
Others	62
Total:	264

Discussions were held with Kaiser Engineers on the procurement of prototypical material necessary for certain components of the reactor, ie., butterfly valves and diversion valves for the process tube assemblies. They agreed to handle these types of orders with engineering contacts being maintained by General Electric Company.

Assistance is being given the AEC on preparation of flow sheets outlining the proper handling of drawings, requisitions, design and field changes, etc.

An analysis of projected NPR Phase II and Phase III unscheduled outage performance based on comparison with existing plant experience was made for Federal Power Commission Study use.

A study of the N-Reactor manpower recommendations considering operational training, start-up activity, NPR Project Section needs, and replacement training for Manufacturing personnel was prepared at the request of Manufacturing Operation to assist in budget preparation.

Design Review and Consultation

Reviews were completed and formal comments were offered on scope and design material as follows:

Drawings	208
Specifications	18
Criteria	8

Discussions have been held with Kaiser Engineers on methods of assembling reactor components, problems involved in crate fabrication, sequence of nozzle and connector assemblies, testing and methods of leak detection. A general meeting was also held with Design and Kaiser Engineers on process piping procurement and construction consideration.

E. W. Wilson was assigned with other Project Group representatives, to the Burns and Roe Company, Hempstead, New York office to assist in expediting the heat conversion plant scope design. During this period three official representative meetings were held in which the river pump house design, proposal for reducing the reactor coolant temperature during shutdown, and power house design were approved.

2. Trips

E. W. Wilson, Field and Operations Engineering, along with W. R. Conley, Research and Engineering, and M. H. Russ, Systems Design Engineering, Established an office at the Burns and Roe, Incorporated, building, Hempstead, New York, on September 8. He was at this location during the period from September 8 to September 25.

3. Visitors

Fred Swanson, Sundstrand Corporation, and Paul Berner, Star Machinery Company, visited the 2101 Building on September 22 to discuss modifications for the pre-shop surfacing equipment needed for the NPR graphite machining program.

R. A. Demaline and Phil Hastings, National Carbon Company, Cleveland, Ohio, visited the plant August 31, 1959, to discuss the NPR graphite program and view the 2101 fabrication facility.

D. Consulting Engineers

1. Activities

Efforts were continued in support of the AEC-Federal Power Commission nuclear power study. A large number of alternate NPR conversion cases were reviewed jointly with Burns and Roe and AEC personnel to establish power production costs and other economic factors.

1. Activities (Continued)

Meetings were attended at Portland, Oregon and Hempstead, New York with Bonneville Power Authority, Federal Power Commission, Burns and Roe, and AEC representatives regarding engineering problems connected with nuclear power generation.

2. Reports Issued During the Month

HW-62017 RD - "Estimated Fuel Costs for Use in FPC Study," W. J. Dowis, September 22, 1959.

HW-61933 - "Information in Support of the FPC Study," W. J. Dowis, September 16, 1959 (Confidential-Undocumented).

HW-61738 - "Computational Aids for Estimating Performance of Liquid to Boiling Water Heat Exchangers," W. J. Love, September 1, 1959.

E. Program Evaluation

1. Activities

Schedules

On 9-15-59 Kaiser Engineers issued the first proposed preliminary NPR working schedule. This schedule takes into account the current planning of design, procurement, and construction. There are certain key features that will have to be integrated as the job progresses. The over-all project schedule is definitely procurement limited. While construction of the 190 Building has been seriously delayed, completion of the project remains the same. The most serious effect of this program delay will be an extremely high peak of qualified craftsmen needed late in the job.

At the request of the AEC, an analysis has been made of potentially improving the presently contemplated construction completion by six months. Assuming CPFF construction for both the 190 and 105 Buildings, with other construction being expedited as soon as possible, certain key design and construction features can be improved. Any real improvement to the schedule is dependent upon the long-term procurement items.

Design Status

	Wt'd Total	Certified Schedule	Actual % Complete
Reactor Plant as of 9-30-59			
Title I			
Scope		93	90
Title II			
Drawings	70	21	23.5
Specifications	8	12	11.4
Requisitions	8	0	.9
ATP's	4	0	0
Development and Testing	10	52	43.5
Total	100	20	21.78

	Wt'd Total	Certified Schedule	Actual % Complete
Heat Dissipation Plant as of 9-30-59			
Title I			
Scope Criteria(a)		52	47.75
Title II as of 9-30-59			
Detail Design		29	27

	No. Req'd	No. Issued to 9-18-59 Scheduled	Actual
Criteria	(b)	(b)	5
Preliminary Drawings	25	23	23
Detail Drawings	730	55	55
Specifications	165	8	9
Requisitions	150	9	10
ATP's (No. being developed)	(b)	(b)	0

Note: (a) The scope schedule was revised on 8-3-59. Previously the scheduled completion for 9-1-59 was 100 percent.

(b) Number required and schedule under revision.

Composite Design Completion (Reactor and Heat Conversion Combined)

	Certified Schedule	Actual % Complete
Title I	75*	71.41
Title II	24	24.08
Total	30.5	30.10

* Based on revised A-E scope schedule.

Cost and Estimates

On 10-1-59 Kaiser Engineers released their 9-8-59 preliminary over-all project cost estimate. This estimate includes $7,200,000 for NPR supporting facilities. At the present stage of development, scoping and detailed design of an unprecedented nuclear reactor, costs cannot be accurately evaluated with any pretense of certainty. A new detailed cost estimate is being prepared by GE for the reactor plant, based upon the latest scope and detailed design information.

WW McIntosh

ACTING MANAGER
NPR PROJECT SECTION

WW McIntosh:mf

END

DATE FILMED

12/7/92