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IRRADIATION PROCESSING DEPARTMENT
MONTHLY REPORT
SEPTEMBER, 1960

HW--66970

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SUMMARY

RESEARCH & ENGINEERING OPERATION

Irradiation of self-supported fuel elements charged in B and C Reactors continued without failure. Twenty columns of bumper elements, ten with four rails and ten with three rails, were charged into D Reactor to determine handling problems with these designs. Four columns of enriched bumper elements were discharged from D Reactor and showed an improvement factor of 38 with a 95% confidence level over normal I&E fuel.

The test irradiations in support of NPR fuel development continued in KER Loops 3 and 4. The heavy-walled single-tube elements and defected fuel elements in KER-3 have reached about 970 MWD/T of the goal exposure of 2500 MWD/T. The eight natural uranium tube-and-tube elements in KER-4 have reached about 1560 MWD/T of the scheduled 2500 MWD/T exposure.

The Monte Carlo program was used to compute first-flight collisions of fast neutrons in concentric-cylinder fuel geometries. Results were comparable to the previously used Homogenization Model.

The first k_∞ measurement in the PCTR has been completed for the NPR geometry. The measured value was slightly lower than previously calculated.

Chemical analysis and dih purity values of the first shipments of NPR core graphite from National Carbon Company show that the material meets the specification for nuclear purity. Assignment of test reactor space for high-flux testing of the material has been requested.

Tests of methods to reduce the concentration of critical isotopes in reactor-effluent water were continued at 100-D and started at 100-H and B. At 107-D the retention of critical isotopes by aluminum turnings has been demonstrated at flow rates exceeding the laboratory rate previously used. Substitution of aluminum nitrate for the sulfate in water treatment is being made on a half-reactor basis at 100-H to determine the effect of reducing the phosphorus and sulfur in the influent on the Phosphorus-32 in the effluent. A half-reactor test at 100-B was initiated with the same objective as the H test, but using an increased aluminum sulfate feed rate rather than substituting aluminum nitrate. Also, beginning this month the reporting of total effluent activity by reactor will be replaced by a report of the concentration of the critical isotopes in the effluent of each reactor.

A new spline coiler was installed and successfully used at D Reactor. The unit permitted full use of the spline system for startup control and resulted in a significant reduction in nonequilibrium losses.

The primary power level limit at C, KE and KW Reactors was based on fuel element failure control. The other reactors were restricted by bulk outlet temperature limits.

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MANUFACTURING OPERATION

Production

Reactor input production was 8.2 percent above forecast; 0.9 percent above at the six old reactors and 18.4 percent above at the K's. Forecast was exceeded due to high time operated efficiency and average power levels, at the K's.

Over-all time operated efficiency was 83.0 percent (82 percent forecast); 80.2 at the six old reactors and 91.6 at the K's. A new time operated efficiency record of 94.5 at KE exceeded their previous maximum (May, 1960) by 1.2 percent.

There was no increase in the combined reactor instantaneous power level or the individual reactor record power levels.

Three ruptures, two I&E regular metal and one I&E enriched were removed from the reactors. The regular metal ruptures were at C and D, the enriched at DR. The enriched rupture failed at 11 percent of goal concentration due to mechanical damage. This represents the best rupture experience since November, 1959 and is 66 percent lower than the previous best month's experience during 1960.

Engineering

A study to review the progress of development and test work and to firm up plans relative to scope and schedule for the Bumper Fuel Program was summarized in a letter to the Manager, Manufacturing (Document HW-66919, issued September 27, 1960). A target schedule recommended for planning and budgeting purposes assigns general priority to the conversion of K Reactors following the lead-reactor application at D Reactor and application at H Reactor for the E-N Load Demonstration. The recommendation, based mainly upon economic considerations, recognizes that contingencies such as fuel availability and nozzle procurement lead-time may dictate conversion of a third old reactor prior to the K's in preference to delaying the total program.

A study is in progress to find ways of reducing helium losses. It includes review of system components and system operation, recommending improved operation procedures for unloading, addition, and purging, methods of leak detection and subsequent correction. Facilities Engineering has been requested to prepare an engineering scope of a gas purification and recovery system.

A study has shown that the extensive modifications to 105-C metal loading elevator, as required by code and sound engineering to adapt it to carry personnel, would be more costly than providing a new elevator for the personnel service.

Recent tube replacement outages indicate an increased number of tubes which cannot be pulled into the reactor. New tool development is required to

achieve tooling which will perform channel straightening to correct tube pull-in difficulties as well as reduce tube damage resulting from graphite abrasion.

FACILITIES ENGINEERING OPERATION

Administration for the downcomer model testing program at Washington State University has been transferred to the Research and Engineering Operation.

A report has been received from Mr. G. R. Rich, Consulting Engineer, listing his recommendations for improving the export water system. Additional information has been requested since his recommendations were not sufficiently detailed to permit design of the proposed modifications.

Over-all design completion for Project CGI-791 is 99.5 percent while detail design is 99.0 percent complete. Both the aerosol generators and the smoke photometer are being calibrated in preparation to develop a procedure for field checking the absolute filters following installation.

Detail design for Project CGI-844 is 10 percent complete. Three specifications for engineered equipment have been approved.

Detail design for Project CGI-883 is 33 percent complete. Requests for the purchase of engineered material have been transmitted for transformers, voltage regulators, grounding resistors, and motor control centers. Preliminary results of a study regarding the feasibility of installing the new 190-K low lift pumps prior to completion of electrical modification indicate that these changes are technically feasible; however, precautions will be required to insure that the emergency electrical system is not overloaded.

Scope design for Project CGI-884 is 90 percent complete; 80 percent of the detail design has been completed.

New prototype seals for the ball and flapper valves of the remote rear face installation were laboratory tested. Overboring work was reoriented toward a 550 mil overbore at C Reactor, and satisfactory preliminary tests of process tube hardware designed for a somewhat lesser overbore were performed. An attempt to charge bumper slugs in D Reactor ended when the slugs could not be charged through the existing channel curvature.

In NPR work, recommendations were made for a rear tube to nozzle joint and for nozzle closures. Three design tests were completed and initial tests were performed on an expanded dump system evaluation test.

Washington State University has submitted a final proposal for the Columbia River Scale Model after acceptance of their facilities and personnel by the River Model Advisory Committee.

Following failure of two 4500 HP motors, faulted coils in each unit were successfully isolated.

Columbia River temperature control efforts were continued although results remain nominal due to continuing cool weather.

Appropriate tests of coal for the fiscal 1961 contract season were made.

An accelerated target schedule for beneficial use of Reactor Confinement facilities (Project CGI-791) has been proposed by the AEC. This schedule requests beneficial use in 100-F Area by October 21, 1960, and of all areas by January 22, 1961. The J. A. Jones Company has been asked to try to achieve this several months speed-up and to provide an estimate of the additional cost.

NPR PROJECT OPERATION

The Phase II bid package for the 109-N and 105-N Buildings was issued on schedule September 15, 1960. This package completed the majority basic design information items for the Project. Major design activity will now be directed to acceptance testing, system descriptions, and vendor drawing review. Review of vendor information has disclosed the need for additional design detail, including such items as anchor bolt data and the need for review of analytical primary loop transient studies on the integral relations of the many major pieces of equipment.

Concrete placement in the 105-N Building during September, 1960, was at about 156 percent of the August rate.

Graphite machining continued to lag. Notching is now about three months behind schedule. Procurement of graphite continued satisfactorily.

Fabrication and delivery of zirconium process pilot order tubes from Allegheny-Ludlum and Harvey Aluminum is satisfactory. Progress by Chase Brass on pilot order process tubes and Wolverine Tube for graphite cooling tubes is behind schedule. The production order of process tubes at Harvey Aluminum is ahead of schedule.

FINANCIAL OPERATION

Work in Process Inventory at June 30, 1960, was priced at current rates for comparison with book values. Minor discrepancies in the method of preparing the AEC Product report were discovered and changes recommended.

Essential Material and Frozen Lunch inventories were observed in H Processing on August 25, 1960.

Total number of personnel assigned to the Department at month end is 2,260, a decrease of 15 from the previous month.

During the month, suggestion awards aggregating $934 were paid to Department employees. Calendar year to date awards aggregate $5,185. Authorized allocation for 1960 is $11,875.

The absence and injury records pertinent to the 79-day period ended at midnight September 19, 1960 were examined. Nothing was found to prevent

the Department from achieving the fourth consecutive HAPO General Manager's Safety Award.

RELATIONS PRACTICES OPERATION

Three technically trained candidates were interviewed with no offers extended. Four monthly employees transferred into the Department from other HAPO and GE components; one employee transferred to another HAPO component; and four employees went on leave of absence. Six security violations occurred during the month.

GENERAL

RESPONSIBILITY

Effective September 1, the name of the former Plant and Industrial Engineering Operation was changed to Plant Engineering. A new component, Equipment Application Engineering,was established within this operation.

FORCE SUMMARY

	Exempt	Non Exempt	Total
General	2	2	4
Research and Engineering Operation	108	64	172
Manufacturing Operation	389	1364	1753
Facilities Engineering Operation	123	43	166
NPR Project Operation	78	30	108
Financial Operation	17	14	31
Relations Practices Operation	7	19	26
TOTAL	724	1536	2260

SAFETY, SECURITY & RADIATION EXPERIENCE

Six security violations occurred. There were no disabling injuries or radiation exposures exceeding operational control. One hundred and eight medical treatment injury cases were treated.

INVENTIONS

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.

W. Dalos, "Electrical Circuitry for a Time Delay Relay", September 24, 1960.

J. E. Hanson, "Hydraulic Pump-Flange-Bolt Tightener", September 27, 1960.

GENERAL MANAGER
IRRADIATION PROCESSING DEPARTMENT

AB Greninger:OCS:bam

RESEARCH AND ENGINEERING OPERATION

PROCESS AND REACTOR DEVELOPMENT OPERATION

REACTOR FUELS

Present Reactor Technology

Projection Fuel Testing

Five columns of self-supported fuel elements (end-spider support design) were charged into ribless tubes in B Reactor bringing the total to nine columns in reactor.

No additional installation of Zirconium tubes was made in C Reactor. The total of 69 Zirconium tubes underwent normal irradiation practices without incident during the past month.

Twenty columns of solid rail bumper fuel elements were charged into D Reactor during the September 11, 1960 outage. Ten of these columns contained four rail slugs. Also charged were ten columns of three rail slugs in which the rail between the ribs was omitted to permit the use of poison splines. Thermocouple probes were inserted in the downstream dummy patterns of six of the three-ribbed columns to determine the effect of this design on temperature uniformity in the coolant.

The irradiation of four tubes of 1.47% enriched bumper elements in D Reactor was terminated September 24, 1960. Discharge was completed without incident. The factor of improvement over normal I&E geometry fuel was 38 with a 95% confidence level.

Advanced Reactor Technology

High Temperature Irradiations - KER Facilities

The heavy-walled single-tube elements in KER Loop 3 continued under irradiation without incident. The elements have reached an estimated exposure of 970 MWD/T. The test will provide information on the behavior of an element similar in geometry to the inner tube of an NPR fuel element and will in addition provide some irradiated fuel for in-reactor failure testing.

The eight natural uranium tube-and-tube elements in KER Loop 4 continued under irradiation without incident. This charge has attained an exposure of approximately 1560 MWD/T.

KER Loops 1 and 2 are currently empty awaiting more charges now under preparation.

Fuel Design Analysis

The hydraulics portion of the IBM fuel design program was modified slightly to give agreement with flow laboratory determination of the drag produced

Test No.	Type Metal	Tubes	Reactor	Goal Exposure	Current Exposure	Remarks
IP-84-A	Projection self-supported fuel in ribless aluminum tubes					Preliminary evaluation of self-supported fuel elements. Routine charging to continue until tubes are replaced. Ultrasonically attached supports current being
	a. Supports at 1/7 position	7	B	1200 MWD/T	Varies with charge date	used. Goal exposure increased from 900 MWD/T to 1200 MWD/T.
	b. End spider	9	B	1200 MWD/T		Initial charging of end-spider supports.
IP-171-A	a. Solid X-8001 & C64-F		B	Variable 500 MWD/T	872 MWD/T	Provide for evaluation of alternate aluminum component vendors. Control columns are only ones carried special. Rest are lot charged. Control column discharged on 9/19/60.
	b. I&E X-8001 OIIN		F	Variable		Provide for evaluation of alternate aluminum component vendors. Control columns are only ones carried special. Rest are lot charged. Cliff Manufacturing components are now under irradiation. Control columns erroneously listed as charged in last month's report. Control material has not been charged.
IP-216-A	Normal Prod. Nat. OII, CII & KIII fuel elements	72	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.

Test No.	Type Metal	Tubes	Reactor	Goal Exposure	Current Exposure	Remarks
IP-255-A	Solid Black Mint	7	H	2 years	11 Mos.	Provides for long term irradiation of solid black mint for conversion ratio, and fuel performance determination. Three control columns discharged for special extraction.
IP-262-A	a. Bumper supported fuel in ribbed process tubes	17	D	1200 MWD/T 2 pr at 800 MWD/T	825 MWD/T	Provides for testing of bumper type fuel elements in ribbed process tubes. Each of the 19 bumper columns is paired with a control column.
	b. Bumper fuel run-to-rupture tes.	4	D	Rupture	860 MWD/T	Provides for demonstrating a rupture resistance improvement of a factor of 40 at the 95% level. Two control failures at 350 MWD/T. All controls discharged.
	c. 100 tube	20	D	To be determined by b. above		Provides for determining handling problems associated with bumper fuel elements.
IP-263-A	Nickel Plate	8	DR	800 MWD/T	750 MWD/T	Provides for testing to determine if the spalling effects in nickel plate has been eliminated. Two columns discharged at 425 for examination.
IP-272-A	CIVN Geometry I&E self-supported fuel	29	C	Variable		Provides for testing of CIVN geometry fuel in C Reactor ribless zirconium process tubes.

Test No.	Type Metal	Tubes	Reactor	Goal Exposure	Current Exposure	Remarks
IP-300-A	8 Nat. U- Hot-headed tube-and-tube elements	1	KE	2500 MWD/T	1560 MWD/T	Charged April 25, 1960, in KER Loop 4.
IP-309-A & IP-309-A Supp. A	Four heavy-walled single-tube elements; two heavy-walled single-tube elements with capped jacket defects for failure testing	1	KE	2500 MWD/T	970 MWD/T	Charged in KER-3 on July 3, 1960.

by "suitcase handle" supports. This completed a modification started last month.

A variety of potential fuel element candidates for the KER loops have been analyzed by the revised program. Among the possibilities investigated were: an early NPR inner tube enclosed in a Zr-2 sleeve utilizing both four and three supports at both ends of the fuel pieces; the present NPR inner tube utilizing again an inert sleeve of both natural uranium and a .974% enrichment; large 1.6% enriched fuel elements with an inert center rod; and a possible uranium dioxide Zr-2 clad element for KER irradiations.

REACTOR PHYSICS

Present Reactor Technology

E-N Conversion Ratio

No results have yet been obtained from the isotopic analyses of enriched uranium and lithium slugs irradiated earlier this year.

Speed of Control Studies

Studies have been initiated to investigate the effects of various powers and graphite temperatures from the standpoint of control speed. These studies are directed at conditions which can exist during reactor startup as opposed to equilibrium operation for which a considerable amount of analysis is already available. This work will continue.

Advanced Reactor Technology

N Reactor Fast Flux

An estimate of the neutron flux above 1 Mev in the NPR was made as a guide in programming experimental irradiations of Zr in test reactors. The figure being used is 1.35×10^{21} nvt/year at 4000 MW.

Critical Mass Studies

Buckling measurements have recently been completed on 1% enriched uranium - light water lattices utilizing NPR fuel geometries. Results obtained to date show the initial assumptions on which N Reactor fuel element storage and handling were based were adequately conservative and no real critical mass problems exist in the facility as designed.

Monte Carlo Calculations

The Monte Carlo slowing-down program has been completely debugged. A subroutine of this program was used to compute first-flight collisions of fast neutrons in concentric-cylinder fuel geometries. Previously the assumption had been made that the fuel water and cladding could be homogenized in obtaining collision probabilities in N Reactor fuel geometry. This assumption was checked with the following results.

Collision Probability	Monte Carlo	Homogenization Model
Total	.4411	.4718
Uranium	.3052	.3019
H_2O	.1043	.1348
Clad	.0316	.0352

The Monte Carlo results are derived from 10,000 histories.

N Reactor Physics Measurements

The first k_{oo} measurement in the PCTR has been completed for N Reactor geometry. The value obtained was for a wet lattice from which the voids had been removed. The measured value of 1.069 was slightly lower than previously calculated. Work will continue to define experimentally the N Reactor lattice parameters.

REACTOR ENGINEERING

Present Reactor Technology

Nozzle Testing

Special reamed nozzles are undergoing miscellaneous tests to assure their suitability for use with bumper slugs. Included are impact, static internal pressure, cyclic torque, and cyclic tensile tests.

Reactor Reorificing Studies

An analytical and experimental program is underway to determine suitable reorificing systems for reactor fringe tubes loaded with I&E fuel elements. Data indicates that desired flow rates cannot be obtained by a simple orifice at the front cross header because of the necessity of avoiding cavitation during normal operation and the requirements on low trip pressure in the event of front connector failure. Several possible solutions are under consideration.

Charging Patterns - Flow Protection

The effect of changes in the length of the downstream dummy charge on the flow protection was reviewed. Significant reductions in dummy charge length can be made with no appreciable effect on the TAI (Trip After Instability) limit. It is necessary to retain at least 24" of perforated dummies downstream of the active charge.

Advanced Reactor Technology

Decontamination

Radiochemical analyses on samples obtained during the decontamination of KER-1 are being made. Data from these samples shed some light on the distribution of activity deposited on piping, but no results are yet available.

A long term corrosion test of bisulfate formulation has begun. The dissolved oxygen content of the water will be minimized to determine the effect of this step on the corrosion of the piping material.

NPR Graphite

Great Lakes Carbon Corporation continues their efforts to purify four graphitizing furnace heats of reflector graphite which fail to meet the 25 dih purity specification. These four heats, if successfully completed, will complete the order for reflector graphite placed with Great Lakes.

Observation of the processing of bars for the NPR core by National Carbon Co. revealed that the product is of apparent high structural quality. Chemical analysis and dih purity values of the first two shipments show that the material also meets the specification for nuclear purity.

Requests have been submitted to the AEC for assignment of two high fast flux positions in a testing reactor for the irradiation of test specimens of NPR core graphite. Preparation of these test specimens from the first bars delivered by National Carbon Co. is underway.

RADIOLOGICAL ENGINEERING

Radiation Control Experience

The following table summarizes the radiation exposure experience of critical IPD classifications for the first 36 weeks of the 1960 badge year:

Classification	Total Dose	No. of Employees	Average Dose/ Employee	Extrapolated Year End Average	No. of Employees over 3r Extrapolated Exposure
Radiation Monitors	165136 mr	84	1966 mr	2840 mr	25
Processing Operators	415066 mr	252	1647 mr	2379 mr	27
Pipefitters	131681 mr	92	1431 mr	2067 mr	4
Millwrights	103858 mr	75	1385 mr	2000 mr	6

Lapse of Control

Lapse of Radiation Control
Distribution by Reactor and Component

	B	C	D	DR	F	H	KE	KW	IPD Totals
Processing	0	0	1	2	2	1	2	0	8
Maintenance	0	0	0	0	0	0	0	0	0
Supplemental Crews	0	0	0	0	0	0	1	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	1	0	0	0	0	0	1
Reactor Areas	0	1	0	1	1	0	0	0	2
Assigned Totals	0	1	2	3	3	1	2	0	12
IPD General									
Outside IPD			1						1

Vertical columns do not necessarily add up to the assigned totals, because in some cases, a Lapse of Control is chargeable to more than one component.

Beginning this month the total effluent activity by reactor is deleted from this report. Instead the concentration of isotopes of concern in effluent water will be reported. Samples for isotopic analysis are taken weekly except in the case of chromium-51 for which only one analysis per month for each reactor is run.

Reactor	P^{32}	As^{76}	Zn^{65}	Np^{239}	Cr^{51}
B	11	170	6	135	280
C	12	155	16	125	150
D	7	80	8	205	320
DR	10	125	9	225	300
F	14	100	23	95	180
H	12	90	11	100	160
KE	--	--	--	--	80
KW	5	75	11	60	110

For isotopes other than Cr^{51} the values quoted are the averages of the weekly analysis. The numbers are in units of micro micro curies/cc.

Reactor Effluent Water Investigations

The effluent treatment tests at 107-D where the effluent water is being passed through a bed of aluminum turnings have advanced from tests which largely duplicated laboratory work to tests at higher flow rates. The initial tests showed the same efficiencies for reduction of critical isotopes as did the laboratory tests. Dose rates from the sides of the tank increased from 300 mr/hour to 800 mr/hour when the flow rate was doubled. This indicates that the efficiency for detaining the shorter lived nuclides was not reduced by the change in flow.

A half-reactor test at 100-H substituting aluminum nitrate for aluminum sulfate in process water treatment was started September 16. This test is intended to demonstrate the amount of reduction in the output of phosphorus-32 that can be achieved by removing more than 90 percent of the phosphorus and half the sulfur from the influent water. The feed rate was increased from 12 ppm at the start of the test to 25 ppm on September 21. Since that time the pH of the process water on the test side has been controlled by adjusting the aluminum nitrate feed. No difficulties in the water treatment plant nor in reactor operation have been encountered. Therefore it does not appear that addition of nitric acid for pH control will be required until river water quality deteriorates in the spring.

Another half-reactor test started at 100-B on September 16. Because of the uncertainty surrounding the importance of sulfur as a precursor to phosphorus-32 and in order to demonstrate the effectiveness of conventional and less costly aluminum sulfate to remove critical isotopes, this test duplicates the test at 100-H except that the sulfur in the influent water is not reduced. The feed rate of alum on the test side was increased to 10 ppm on September 16 and further increased until it reached 20 ppm on September 22. It will remain at that level for the duration of the test. No difficulties have been experienced and none are anticipated.

MPC For Effluent Water Deposition Products

Calculations were made to determine the maximum permissible concentration (MPC) in air for effluent water deposition products which are a primary source of airborne contamination in the reactor discharge areas. The MPC was calculated to be 1×10^{-7} uc/cc, and the critical organ is the lung.

PROCESS TECHNOLOGY OPERATION

REACTOR POWER LEVEL LIMITATIONS

The primary power level limits at C, KE, and KW Reactors was based on fuel element failure control, and the power levels at B, D, DR, F, and H Reactors were primarily restricted by bulk outlet temperature limitations.

WATER TREATMENT

Aluminum Nitrate Test

100-H water treatment plant started feeding approximately 28 ppm aluminum nitrate on September 21, 1960, on the west side. No difficulties occurred. Water quality is good and filter headloss is low. Filter rates have not been high enough to establish water plant capacity using the high feed rates.

High Alum Test

100-B water treatment plant started feeding 20 ppm alum on September 21, 1960, on the north side. Water quality is good and filter headloss is low. Initially, filter runs dropped to four hours due to breakthrough. Thereupon, approximately 0.003 ppm Separan was added and the runs lengthened to 10 hours.

Pasco Water Treatment Plant

As a result of better monitoring of filtered water suspended materials, alum feeds have been reduced by 50 per cent and sodium carbonate feeds have been eliminated.

PROCESS STANDARDS

HW-46000 B, Process Standards - Reactor

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

Process Standard C-090 - "Inoperable Rods and Ball 3X Hoppers During Reactor Operation"

The restrictions imposed upon the number of horizontal rods that may be out of service during reactor operation were removed from the standard. The number of horizontal control rods in service during operation is no longer a reactor safeguard consideration, since they are not considered in total control calculations during operating periods. Only rods in the reactor are considered for reactivity control under the Total Control Criterion.

Process Standard D-070 - "Reactor Confinement - Fog Spray System"

Functional testing requirements for the fog spray system were transferred to the Process Equipment Standards manual, HW-41000.

Functional testing requirements previously contained in Process Standard D-070 were deleted. A reference to the equipment standard was added to the reactor standard.

Process Standard F-011 - "Process Materials" (Poison Material)

Due to manufacturing difficulties associated with dispersing cadmium in an aluminum-silicon alloy, the cast uncanned, tubular Al-Si-Cd dummies are not believed to be the cheapest neutron absorbing material available. However, approximately 2600 unused Al-Si-Cd dummies remain from a production test.

Provisions for use of uncanned, tubular Al-Si-Cd poison dummies, drawing number H-1-1112, have been added to this standard. Testing under Production Test IP-174-IE, HW-59627, showed that reactor safety and life considerations will not be compromised by use of these poison dummies.

Process Standard F-011 - "Process Materials" (Chemicals)

Chromic acid and Turco 4306-B have been added to this standard as acceptable for reactor decontaminating agents.

Formerly, decontamination of test hole facilities or traverse tubes was accomplished under provisions of an approved production test. Sufficient data existed to permit use of chromic acid under limited conditions, for decontamination of these facilities. Turco 4306-B is presently limited to decontamination of reactor rear face piping, under closely controlled flow conditions. The standard prohibits use of Turco 4306-B solution through reactor, or in contact with zirconium tubes.

HW-46000 D, Process Standards - Reactor

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

Process Standard C-090 - "Inoperable Rods and Ball 3X Hoppers During Reactor Operation"

Revisions to this standard are identical to those for HW-46000 B, above.

HW-46000 F, Process Standards - Reactor

Three revised standards were issued during the month. These were:

Process Standard C-090 - "Inoperable Rods and Ball 3X Hoppers During Reactor Operation"

Process Standard D-070 - "Reactor Confinement - Fog Spray System"

Process Standard F-011 - "Process Materials" (Chemicals)

Revisions to these standards are identical to those for HW-46000 B, above.

HW-46000 H, Process Standards - Reactor

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

Process Standard D-070 - "Reactor Confinement - Fog Spray System"

Process Standard F-011 - "Process Material" (Chemicals)

Revisions to these standards are identical to those for HW-46000 B, above.

HW-46000 K, Process Standards - Reactor

Four standards were issued during the month. These were:

Process Standard C-090 - "Inoperable Rods and Ball 3X Hoppers During Reactor Operation"

Process Standard F-011 - "Process Materials" (Chemicals)

Revisions to these standards are identical to those for HW-46000 B, above.

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

The former, more restrictive, operating limits for KER Loop #1 resulted from uncertainties in metallurgical test data of the original process tube. Recent installation of a new, thoroughly tested Zircaloy-2 process tube now permits increased operating limits consistent with Loops #2, 3, and 4.

Pressurizer safety valves and rupture disc settings were reduced to 1720 psig for all KER loops. A maximum rate of pressure change during hydrostatic pressure testing was added to minimize the possibility of over-stressing the process tube.

Process Standard K-040 - "1706 KER Recirculation Facility - Recirculation With Fissionable Charge"

This revision authorized a 15 psi increase in annunciator setting of the tube's exit pressure for operational latitude.

PROCESS CHANGE AUTHORIZATIONS

Eight Process Change Authorizations were issued during the month to permit temporary deviation from Process Standards - Reactor, HW-46000, and three Process Change Authorizations were issued to permit temporary deviation from Process Standards - Water Plant, HW-27155 Rev1. These were:

PCA #0-75-"Bismuth Irradiation in Front-To-Rear Test Holes - KE Reactor"

The K Reactors have several front-to-rear test holes which are normally used for irradiation of special request material. The test holes contain two

concentric aluminum tubes, each having a separate coolant header.

When the test holes are not loaded with special request charges, it is desirable to gainfully use them for irradiation of bismuth material. Front-to-rear test hole 3674 has been temporarily assigned to KE Processing Operation for production use.

The operating requirements and limits for these tubes are not specified in Process Standards since they are not normally used for production purposes. However, since 3674 is being used for bismuth irradiation, appropriate operating limits were specified in the PCA.

PCA #0-76 - "Water Leak - H Reactor"

Process Standard B-010 specifies that the reactor shall be shut down when water collection rate from the gas atmosphere exceeds 24 gallons per day.

On August 6, 1960, the collection rate slightly exceeded the specified maximum rate permitted in the referenced standard. No loss of reactivity was observed, which indicated a leak outside the active zone of the reactor.

Authorization was given to continue operation until August 15, 1960, at which time manpower scheduling could be efficiently arranged. Reactor shutdown was specified if any of the following conditions occurred: dewpoints in excess of 15 F, water collection rate greater than 50 gallons per day, or any unexplained loss of total or local reactivity.

PCA #0-77 - "Vertical Bowing Traverse Delay, H Reactor"

Process Standard G-010 specifies that vertical bowing of a top center process tube be taken every three months. Vertical bowing measurements were due during the July shutdown. Several extra outage hours would have been necessary in order to accomplish this requirement.

Authorization was given to defer taking these data to not later than September 26, 1960, since the previous bowing data showed no significant changes in graphite distortion.

PCA #0-78 - "Export line Backup - Raw Water - F Reactor"

Water Plant Standard 190-B-070 specifies that "upon loss of normal electrical power at B, D, F, or H, an emergency steam pump shall be placed on the export system in the area losing power, within 10 minutes, unless it is determined within that time that B and D were not involved in the electrical outage and export line pressure is normal." The steam pump which provides the above backup at F Reactor was removed from service for needed repairs at 8 a.m., on August 16, 1960. Due to the extremely remote possibility of an extended loss of BPA power at all four reactor areas (100-B, 100-D, 100-F, and 100-H) concurrent with loss of steam at 100-B, 100-D, or 100-H, continued operation at F Reactor was feasible.

This process change authorized continued operation at F Reactor for 48 hours with the emergency steam pump on the export system out of service.

PCA #0-79 - "Export Line Backup - Raw Water - F Reactor"

This PCA essentially extended the provisions of PCA #0-78. This was desirable as repair to the emergency steam pump required approximately 48 hours longer than originally estimated.

PCA #0-80 - "Thermal Shield Cooling, K Reactors"

Process Standard A-070 specifies temperature limits for the reactor bottom shield cooling water and the concrete pad directly below the thermal shield. Difficulties have been encountered in meeting these temperature requirements. The limits are specified to control the thermal gradient through the concrete pad.

Operating experience has shown that the thermal gradient in the pad is well below the value which might cause damage to the pad.

Authorization was given for a 40 per cent increase in the maximum outlet temperature limit for the bottom thermal shield cooling water and a 20 per cent reduction in the lower limit specified for the pad. The temperature differential must not exceed 25 C. This authorization will expire October 31, 1960, or upon revision of the referenced standard, whichever is sooner.

PCA #0-81 - "High Graphite Temperature - DR Reactor"

Process Standard C-040 specifies graphite temperature limits for reactor operation. On August 18, 1960, the maximum graphite temperatures at DR Reactor rose to approximately 40 C over graphite temperature limits. Operation of the reactor was continued under the "Emergency Conditions Only" provision in the referenced standard which allows continued operation for 24 hours if the peak graphite temperature achieved is 40 C above temperature limits. During this allowable time, a program of power level reduction, gas atmosphere variation and rod movements was initiated under the direction of the reactor physicist to reduce graphite temperatures to within limits.

Continued operation was permitted with the graphite no more than 40 C above the limit specified in the referenced standard for an additional 24 hours, provided the program for reducing graphite temperature to within limits was continued.

PCA #0-82 - "Low Graphite Temperature, DR Reactor"

Process Standard C-040 specifies graphite temperature limits for reactor operation. Due to graphite temperature cycling in the non-equilibrium period following recovery from a #1 safety circuit trip, it was necessary to operate with lower than specified graphite temperatures to provide adequate control of the reactor.

Authorization was given to continue operation with graphite temperatures no

more than 25 C below the limit specified in the referenced standard for a maximum period of 24 hours.

PCA #0-83 - "Export Line Backup, Raw Water - F Reactor"

Water Plant Standard 190-B-070 specifies that "upon loss of normal electrical power at B, D, F, or H, an emergency steam pump shall be placed on the export system in the area losing power, within 10 minutes, unless it is determined within that time that B and D were not involved in the electrical outage and export line pressure is normal." The steam pump which provides the above backup at F Reactor was removed from service for needed repair to the speed reduction gear on August 24, 1960. Due to the extremely remote possibility of an extended loss of electrical power at all four reactor areas (100-B, 100-D, 100-F, and 100-H) concurrent with loss of steam at 100-B, 100-D, or 100-H, continued operation at F Reactor was feasible.

This process change authorized continued operation at F Reactor with the emergency steam pump on the export system out of service until August 29, 1960.

PCA #0-84 - "Water Leak - DR Reactor"

Process Standard B-010 specifies that the reactor shall be shut down when the water collection rate from the gas atmosphere exceeds 24 gallons per day.

On August 27, 1960, the water collection rate slightly exceeded the specified maximum rate permitted in the standard. No reactivity loss was observed which indicated the leak was outside the active zone of the reactor.

Based on the above conditions, authorization was given to continue operation until September 1, 1960. Reactor shutdown was required if any of the following conditions occurred: dewpoints in excess of 15 F, water collection rate greater than 50 gallons per day, or any unexplained loss of total or local reactivity.

PCA #0-85 - "Removal of High Pressure Crosstie Flow Limiting Orifices, K Reactors"

Removal of the flow limiting orifice from the high pressure crosstie was planned. Concurrently, safety circuit changes were to be made which would delay opening of the V-73 valve until five seconds after the aiding reactor has been shut down.

This PCA presented a valving procedure to be used at a shutdown K Reactor to minimize the amount of coolant that could be diverted to it from the other K Reactor.

PROCESS ASSISTANCE

Auditing

One engineer audited the conformance to Process Standards by making 17 in-

spections at each reactor during the report period.

Graphics

Graphic services prepared 30 charts, graphs, and visual aids for various IPD and HLO components.

RUPTURE EXPERIENCE

Failure Date	Tube Number	Lot Number	Type of Material	Exposure	Type of Failure
9/23/60	1486-C	KJ-239-D	I&E N	577	Side Hot-Spot
9/24/60	1960-D	VL-037-D	I&E N	640	Side Hot-Spot
9/25/60	0684-DR	KH-208-D	I&E E (0.94%)	118	Mechanical Damage

Legend:

I&E E - This is the symbol for internally and externally cooled production reactor fuel elements with uranium cores enriched in U-235. The weight per cent U-235 in the core material is stated.

I&E N - This is the symbol for internally and externally cooled production reactor fuel elements of natural uranium.

Side Hot-Spot - The failure was probably caused by accelerated corrosion of the external can-wall in a localized region of high temperature.

Mechanical Damage - The failure was probably caused by mechanical damage of the fuel element before irradiation.

OPERATIONAL PHYSICS OPERATION

PILE PHYSICS ASSISTANCE

Flattening efficiency remained high with the total ECT above 77 percent for the eighth consecutive month. However, flattening efficiency continued to be somewhat reduced at some reactors because of the decreased incentive while operating on bulk outlet temperature rather than individual tube power limits. Nonequilibrium losses tended to be lower for those reactors limited in level by bulk effluent temperatures because of the greater flexibility to permit flux distributional unbalance under pre-equilibrium conditions.

SUMMARY OF OPERATING DATA OF PHYSICS INTEREST
FOR THE MONTH OF SEPTEMBER, 1960

Reactor	B	C	D	DR	F	H	KE	KW
ECT in September (1)	1485	1705	1505	1520	1440	1600	2505	2495
12-Month Ave.ECT	1440	1675	1490	1550	1445	1625	2490	2485
Equil.Scram Time (2)	14-16	30-35	15-17	35-40	14-20	25-30	20-22*	18-20*
No. of Scrams and	1/1	0/0	0/0	0/0	0/0	0/0	1/0	0/0
Recoveries (3)	1/1	2/1	0/0	1/1	0/0	1/1	0/0	0/0
No. of Non-Scram	3/0	1/0	2/0	3/0	1/0	3/0	3/0	1/0
Outages (4)								
Reporting Period -								
From:	8-23	8-23	8-22	8-23	8-23	8-24	8-25	8-24
To:	9-22	9-21	9-22	9-22	9-22	9-23	9-22	9-21

*Equilibrium scram recoveries are not attempted at the K reactors.

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

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

(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 - S. L. Stewart

Although three outages interrupted operating continuity, and shortage of reactivity following one outage hampered reactor control and limited the pile power level, a new high average ECT was attained.

A failure to make turnaround during the startup on 9-3-60 was due to a flux distortion which reduced the worth of the top part of the HCR system below the calibrated values which are based on a balanced flux distribution. As the size of the radial flattened zone has been increased slightly for higher operating efficiency, minor startup control problems have been experienced due to the decreased capacity of the HCR system to control top to bottom heat shift tendencies as equilibrium conditions are approached.

C Reactor - D. E. Newbrough

Only one outage interrupted the operating continuity. Improved flux distribution control, primarily from the installation and initial application of the zone temperature monitors and increased utilization of the spline system, resulted in a nonequilibrium loss of only 0.16 effective equilibrium day following the cold startup and 0.04 effective day following a scram recovery.

Forty more of the special front enrichment loadings, designed to correct for the downstream flux distortion resulting from 3X balls in the front lattice, were charged this month bringing the total so charged under PT IP-324-C to seventy-three. Preliminary flux distributional data with the first 33 charges indicated about the expected improvement in the axial flux distribution.

D Reactor - J. F. Jaklevick

The installation and successful application of a spline coiler has permitted full use of the spline system for startup control. A nonequilibrium loss of only 0.20 effective day after an infinite outage resulted from the use of 60 startup splines, representing an improvement of about 0.40 effective day less production loss than would have occurred with the former limit of 20 splines per startup.

Although one startup occurred with a partially wet reactor lattice, startup efficiency and subsequent equilibrium operation were hindered only slightly.

DR Reactor - D. G. Montague

The reactor was shut down on schedule September 8 to recharge the entire central zone (980 tubes) for the third time. A distributional flux shifting problem was experienced following a hot startup on 8-26-60 and continued for the two weeks preceding the outage for the full central zone discharge. Plans have been made for alleviating this problem when the newly charged load reaches high exposure in about three months.

DR Reactor - D. G. Montague (Cont'd.)

The variations in gas composition permitted by the remotely operated pile gas system have also contributed to the distributional control problem; however, a new gas control system is being installed which will permit operation of the gas composition from the control room.

Following the block discharge only 0.15 effective day startup loss occurred with the good flux distribution stability at low residual exposure and the operation on a bulk effluent limit somewhat below tube power limits.

F-Reactor - C. D. Wilkinson

Increased numbers of splines were used for flattening, and four splines were used to permit a higher turnaround level. No significant difficulties have been encountered with the spline chopper.

Startup levels were limited predominately by TAI limits of the fringe zone tubes which were not yet equipped with reamed venturis.

Operating continuity was interrupted by only one scheduled outage during the report period.

H Reactor - A. R. Kosmata

The twenty-eight piece loadings charged into the central zone of the reactor to reduce metal cycle costs accompanying the initial central zone block discharge have decreased the radial flattening efficiency slightly; however, the power level continued to be limited only by bulk outlet temperature limits. A desired increase in relative flux in the front of the reactor resulted from the displaced short charges and the heavy downstream loading of Pb-Cd slugs in the PCCF system prior to the block discharge scheduled early in October. To avoid control problems at the current high exposure status all PCCF adjustments were performed during nonequilibrium operation, and compensation for all long-term reactivity gains during equilibrium operation was accomplished by gas composition and horizontal control rod adjustments, a technique which works satisfactorily with the larger fifteen control rod system at H Reactor.

A comparison in temperature between an original imbedded filler block thermocouple and an immediately adjacent geminol stringer couple showed that the imbedded couple read an average of 90 C lower in temperature; other observations also indicate that the original imbedded couple is failing.

KE Reactor - G. F. Bailey

The newly installed rapid temperature scanner, which samples 50 tubes in rapid succession in a manner somewhat similar to the pop-corn popper in the old reactors, has significantly aided the rise to equilibrium power following startups; distributional flux shifting has been reduced considerably. Operational continuity was interrupted by one rupture in solid natural

KE Reactor - G. F. Bailey (Cont'd.)

material and by occurrence of a split spline cap seal during a spline removal operation.

Flattening efficiency and nonequilibrium losses were maintained at the normal favorable levels characteristic of spline usage.

KW Reactor - R. A. Chitwood

The poison column displacement facility has operated satisfactorily, although monitoring of its effect on the flux distribution has been prevented by the inoperability of the traveling wire flux monitor.

The subcritical monitor drive systems continue to function improperly. Start-up and flattening efficiency were normal, although a flux distortion limited the initial startup level following the one outage during the report period.

PROCESS PHYSICS STUDIES

Safety Control Studies

It is difficult to evaluate the total control requirements or capacity for a given fringe poison and compensating enrichment loading pattern. A general analytical solution has been developed for assuring that the combined fringe poisoning and enrichment loading control requirements do not exceed those of a natural uranium fringe loading; an empirical tube power comparison under equilibrium conditions is used as a test. A document explaining the analytical derivation and its application will be issued soon.

Pile Reactivity Studies

An accountability anomoly in the conversion ratio for C Pile enrichment has been traced to use of out-dated lattice calculation information in the 709 program; appropriate changes in the program have been initiated.

A full-time assignment has now been made to initiate NPR startup physics test preparation.

Control Efficiency Studies

D Reactor, with the use of its new coiler, carried out a 60-spline startup with a net loss of only 0.2 effective day. Spline coilers are targeted for the other old reactors by March 1, 1961.

Four poison displacement columns, out of the six-column prototype system, have now been placed in the KW Reactor. Difficulties were encountered in elevator clearance in the two bottom locations; the other two will be charged in the near future.

A study was carried out by Process Technology, supported by Reactor Physics and Operational Physics, to indicate the incentives of using bumper slugs in the E-N program. These studies indicated an appreciable gain in the use of bumpers for the E-N loading over and above the large gain predicted for

use of bumpers with natural uranium.

"Justification for Development of an Automatic Distributional Control System" was published during the month as HW-66818.

Shielding Studies

A factor of two improvement in neutron dosage rates was observed on the B Pile front face following replacement of steel shielding in dry columns with high density concrete. A document describing these measurements and their results is currently ready for publication. A similar measurement at the C Pile indicates a potential improvement of 30% in the front face neutron dose rates.

At the request of Operational Physics, Equipment Development is considering the use of iron-serpentine concrete or iron-polyethylene shielding rings in conjunction with the over-bore test at C Reactor.

A neutron detector facility was installed in the F Reactor top shield during September and is now in operation.

Reactor Fundamentals Training

The Fall series of classes were started for Pile Operators and Reactor Specialists respectively. The Specialists group given class training at this time is the "non-operating" group; i.e., not assigned to normal control room operating duties on a specific shift.

The attendance of approximately two-thirds of those eligible is indicative of the nonroutine assignments which these people have and the subsequent scheduling difficulties. Attendance at the Pile Operator classes, on the other hand has exceeded 90%, and is near 100% if regular absences from work are not counted.

TESTING OPERATION

IRRADIATION TESTING OPERATION

DR-1 Loop

The DR-1 Loop was operated continuously during the report period with the exception of 90 hours during a reactor outage. Test reference conditions (1500F surface temperature) were maintained on the test element for 454 hours, bringing the total testing time to 1319 hours.

The No. 1 motor generator has continued to vibrate excessively under load conditions. It has been returned to the vendor for examination and repair. The vendor has agreed to replace the generator rotors. The new rotors will have stiffer shafts and improved electrical specifications.

An air compressor for back-up instrument air supply to DR-1 has been installed and is being tested before being placed in service.

Loop radiation monitors have indicated a gradual increase on successive reactor startups. Typically, the increase is from about 15 mr/hr to 45 mr/hr. The total fission product concentration in the loop has remained below one curie, with xenon the only isotope identified to date.

H-1 Loop

The H-1 Loop was cooled by single-pass process water during the entire report period.

The No. 3 canned motor pump (Westinghouse Model 150-D) has been shipped to the Westinghouse MTR-ETR Site Operation at the National Reactor Testing Station.

Sample Irradiations

The following samples were irradiated or undergoing irradiation during the month.

Reactor	Test Hole	Facility	Request Number	No. of Samples	Material - Purpose
D-DR,H		PCCF	HAPO 184	10	Washington-designated program
DR		PCCF	HAPO 172	6	Effluent water (radioisotopes in effluent water study)
KW	4B	Snout	HAPO 172	6	
DR		PCCF	HAPO 218	4	Natural uranium (fission product release studies)
F	E	Quickie	HAPO 219	3	Strontium (separations plant waste product study)
F	E	Quickie	HAPO 227	1	UO_3 (isotope production)
F	E	Quickie	HAPO 229	8	UO_2 (thin films)

Reactor	Test Hole	Facility	Request Number	No. of Samples	Material - Purpose
DR		Proc.tube	HAPO 215	1	UO_2 (ceramic fuels investigation)
KW	4C	Snout	HAPO 242	1	Non-fissionable eutectic (PRTR temperature detector test)
DR		PCCF	HAPO 223	1	Antimony-beryllium (neutron source activation)
KW	2C	Hot graphite	HAPO 177	1	Graphite (damage studies)
C	D	Bore channel	HAPO 237	2	Inconel (PRTR Gas Loop material study)
KW	3A	General purp.	HAPO 236	1	Zirconium (creep test)
KE		Gamma		12	Purex waste tank covering material
KE		Gamma		4	NPR radiation alarm chambers
KE		Gamma		8	Grease and oil (damage studies)
KE		Gamma		6	Glass (damage studies)

Borescoping Activities

Process Channel 4163, 105-H - A graphite block has been dislocated and obstructs one-fourth inch of the inlet tube sleeve opening.

Process Tube 3865, 105-D (Ribbed Zirconium Tube) - The tube appeared to be in good condition although heavily coated with film.

Process Tube 4364, 105-D - The top of the tube had been gouged.

Process Tubes 4158, 4160, and 4188, 105-D - These tubes appeared to be in good condition (they were examined because of a reluctant fuel charge movement).

Vertical Bowing Measurements

A summary of the results of vertical bowing measurements taken in process tubes follows. All distances are measured from the process tube inlet flange.

Reactor	Date	Number	Distance	Remarks
H	9-8-60	4674	36 feet	Down .03 inches at 8 feet since 4-20-60. Down .19 inch at 23 feet since 4-20-60

COOLANT TESTING OPERATION

KER Loop Operations

KER-1 - The loop was on single-pass operation with dummies throughout the month.

KER-2 - The loop was on single-pass operation with dummies throughout the month.

KER-3 - Testing, as described and authorized by PT-IP-309-A and PT-IP-309-A, Supplement A, of a Zircaloy-2 fretting corrosion sample and NPR-type fuel elements and the irradiation of defected fuel elements for failure testing in 278C, pH 10 water continued throughout the month.

On September 9, 1960, a severe leak developed on a front face connector fitting. The loop temperature and pressure were decreased at emergency rates without any noticeable change in the leak rate. The reactor was manually shut down to prevent any damage which might result from a complete tubing break.

The defective fitting was replaced. An examination of the fitting revealed four longitudinal cracks in the tubing sleeve. A detailed radiometallurgical examination is underway.

KER-4 - Testing of tube-and-tube fuel elements with "hot-headed" end closures on the inner tubes and the normal welded closures on the outer tubes, as authorized by PT-IP-300-A. Testing is to evaluate the behavior of tubular fuel elements with "hot-headed" end closures during irradiation in 288C, pH 10 water.

On September 12, 1960, a leak developed in the main loop piping about four inches downstream of the junction of the primary heat exchanger exit and bypass lines. The loop pressure and temperature were reduced and the leak examined. The defect was a circumferential crack about one-half inch long. It was decided to leave the loop on recirculation at reduced pressure and temperature until the next reactor outage.

1706-KE Single-Pass Tube Operation

Corrosion and effluent activity testing, as authorized by PT-IP-197-A, Supplements B and C, continued in two central-zone tubes supplied by 1706-KE high-head pumps. The tubes operated under the following conditions:

Tube	pH	Water	Dichromate
4355	7.0	Filtered	1 ppm
4456	7.0	Filtered	1 ppm

Outage Performance

There was one unscheduled reactor outage charged to Coolant Testing during the month:

September 9, 1960 — Front header leak on KER-3

A total of 11.4 outage hours was charged to Coolant Testing as listed below:

Production Test	Description	Time
IP-309-A IP-309-A, Supplement A	Front header leak on KER-3	11.4

Ex-Reactor Facility Operation

1706-KE Mock-Up Tubes - The following tests were continued throughout the month:

1. Corrosion characteristics of aluminum cermets.
2. Corrosion characteristics of nickel-plated fuel elements.

ELMO-4 - One rupture test series was begun during the month.

ELMO-5 - Testing of Zircaloy-2, Haynes Alloy No. 41, Hasteloy-B, and carbon steel subjected to various heat treatments to determine the uniform corrosion in 290C and pH 10 water was continued during the month.

ELMO-7 - Fretting corrosion tests on single-rod, PRTR-type fuel was continued during the month. The thermal cyclic tests on the Flodar tube fitting were completed.

ELMO-10 - Fifteen tests on low-temperature decontaminant scanning were completed during the month.

CEP-2 - Testing of mechanically-vibrated, Zircaloy-2 fretting corrosion samples in 300C, pH 10 water was continued during the month.

CEP-4 - Three decontamination cycles to determine the effects of a deoxygenated system on corrosion of stainless to carbon steel welds were completed. The decontaminants were AP-1 and Bisulf-1.

Dowtherm - The heat transfer tests were started to determine the heat transfer coefficient change with time.

COMPONENT TESTING OPERATION

Irradiated Material Examination

Examinations were completed on the fuel elements from the following thirty-three tubes at the Metal Examination Facility (105-C).

PT No.	Tube No.	PT No.	Tube No.	PT No.	Tube No.	PT No.	Tube No.
216A	2888-KE	216A	3177-H	216A	2470-C		
	2373-KE		3257-H		0750-KW	272A	3561-C
	4657-KE		2561-H		4586-KW		3570-C
	3278-KE		2778-H		5484-KW		3575-C
	3153-KE		0675-H		5476-KW		3675-C
	2483-KE		3768-F		0748-KW		3676-C
	4976-KE		1291-F		1873-DR		2264-C
	4456-KE		0384-F		2658-DR		3873-C
	0670-H						1069-C

Equipment Development

A new positioner was designed and installed in the optical profilometer. This positioner replaces the former device which was incurring frequent breakdowns and causing a considerable reduction of profilometer availability.

Process Tube Corrosion Monitoring Program

In-reactor measurements of 549 process tubes were completed during the month. Listed below are the number of tubes measured per reactor and document numbers of reports issued.

Reactor	No. of Tubes Probologged	Report No.	HW Number
B	86	45	66626
F	62	46	66691
H	24	47	66743
DR	244	48	66782
D	100	49	66797
B	33	50	66832

Visual examination, wall thickness and rib height measurements were completed on one tube from B Reactor, two tubes from H Reactor, and one tube from KW Reactor.

Tube 3370-B was a ribless aluminum tube. The corrosion in the tube was very uniform. There was no evidence of ledging-type corrosion or hot spot areas caused by warped or misaligned slugs. No scratches caused by the supports on the slugs were noticed in the tube.

Tubes 1975-H and 2075-H were removed because they were leakers. In tube 1975-H three transverse cracks were found on the top wall, located approximately 20-1/2 feet from the rear. The leak in Tube 2075-H was found approximately 11 feet from the rear Vanstone flange, located on the top half. The leak resulted from a combination of internal corrosion and the start of a transverse crack.

Tube 1446-KW was removed because of suspected damage in the front portion due to chattering of the seating charge. This portion of the tube could not be split for examination because it was too severely damaged.

Panellit Programs

Gages repaired and calibrated by maintenance personnel during the month totaled 379. Of this number, 63 gages were rejected for failure to meet inspection criteria for a rejection rate of 16.6 per cent. The August rejection rate was 34 per cent.

In-board reliability examinations were performed on 1183 gages. A total of 111 were found to be sub-standard and were removed from service. This is a rejection rate of 9.4, approximately five per cent below the yearly average and 1.5 per cent below the August rate.

Response times were determined on a total of 1183 gages during the month. Of this number, 11 gages showed slow response and received corrective action. This amounts to a 0.9 per cent slow response. Response time determination activities continue to show improved gage response times. Significant progress is shown by monthly performance percentages below:

November, 1959	12.0 (start of program)
December, 1959	9.5
January, 1960	12.5
February, 1960	7.5
March, 1960	4.8
April, 1960	4.85
May, 1960	2.7
June, 1960	3.6
July, 1960	3.8
August, 1960	1.2
This month	0.9

In-board Bourdon coil leak examination of 2145 gages during the month resulted in detection of 11 leaking coils. This constitutes a leak failure incidence rate of 0.51 per cent, virtually equal to the average rate of 0.46 per cent which has been experienced during the past two years.

"Critical component" inspection of Panellit gage components, for warehousing and direct-to-user availability, was as follows:

	Switches	Bourdon Coils
Inspected	143	0
Rejected	35	0
Rejection rate	24.5 per cent	0

Rejection rate of switches was considerably higher than last month's rate but approximately normal for the past year's switch-inspection activities.

During the month, 92 gages received routine failure analysis program attention.

During the month accelerated corrosion testing of dial pivots treated by an "electro-filming of graphite" process, was terminated. Also, a new series of tests was started on a new pivot material identified as Armco, Type 17-4 pH stainless steel. Results of the electro-filmed pivot tests were quite satisfactory in that extremely small quantities of corrosion resulted.

O. H. Greager

PRODUCTION, ENGINEERING & REACTOR OPERATIONS

PRODUCTION OPERATION

PRODUCTION PLANNING & SCHEDULING OPERATION

There were no discharge exposure adjustments effected in September. Metal performance was excellent (only three ruptures were incurred) resulting in an improvement in discharge exposures to the highest level of this calendar year.

Discharge Exposure Comparison (MWD/T)

	Regular Solid		Regular I & E		Enriched I & E	
	6 Old	2 K's	6 Old	2 K's	6 Old	2 K's
July	671	776	659	691	778	762
August	711	588	686	684	788	690
September	697	745	687	706	842	720

ESSENTIAL MATERIALS

Rail and truck shipments received in September were as follows:

Carload shipments for IPD	163
Carload shipments for other Depts.	142
Truck shipments for IPD	223
Total	528

MISCELLANEOUS ACTIVITIES

W. H. Coleman, Field Consultant for the Mfg. Training Program from Ft. Wayne, Indiana, visited HAPO September 19 through 23. His consultation time here was administered to the best overall advantage of all departments participating in the MTP.

The first four classes of Pile Operators were started in the new 14-hour course of supplementary training in reactor fundamentals. This course, like the similar ones for Reactor Specialists and Utility Operators, is being instructed by the Operational Physics Operation.

The class in the new Fundamentals of Manufacturing course started in March resumed its sessions on September 6 following a summer break. Feedback from the spring sessions led to some revision of the remaining lessons, and an overall shortening from 56 to 51 sessions.

Arrangements were made with the Relations Operation for IPD instructors in "Fundamentals of Manufacturing" and N Reactor training to be included in the Instructor Training Workshop to be conducted at Hanford by General Electric Manufacturing Services specialists on October 3-4.

MONTH	REACTOR OPERATIONS STATISTICS – PROCESSING																	
September, 1960	B		C		D		DR		F		H		KE		KW		TOTAL	
INPUT PROD.–Pu (% OF FORECAST)	94.1		106.6		82.6		94.2		124.5		105.2		124.0		113.0		108.2	
TIME OPER. EFF. (% OVERALL)	78.6		79.5		67.7		77.7		90.6		87.0		94.5		88.7		83.0	
NO.OF REACTOR OUTAGES & HOURS	NO.	HRS.	NO.	HRS.	NO.	HRS.	NO.	HRS.	NO.	HRS.	NO.	HRS.	NO.	HRS.	NO.	HRS.	NO.	HRS.
SCHEDULED	0	105.2	1	122.9	1	188.1	1	115.1	0	1)45.6	1	67.2	0	25.0	1	63.0	5	732.1
UNSCHEDULED – SCRAMS	1	1.2	0	-							2	0.5			1	9.8	4	11.5
– OTHER	3	47.4	1	24.8	2	44.4	2	45.6	0	22.1	1	25.8	1	14.7	0	8.4	10	233.2
TOTAL	4	153.8	2	147.7	3	232.5	3	160.7	0	67.7	4	93.5	1	39.7	2	81.2	19	976.8
BREAKD'N OF REACTOR OTGE HRS.																	TOTAL HRS.	TIME
PLANNED																		
CHARGE–DISCHARGE	37.8		53.3		42.7		68.5		22.6		8.6		22.1		48.1		303.7	5.3
TUBE REPLACEMENT	24.7				87.3		11.7		2.0								125.7	2.2
PROJECT WORK			8.3														8.3	0.1
PRODUCTION TEST	2.8		6.1		16.7		3.7		2.2		50.3		1.2		2.2		85.2	1.5
MAINTENANCE	39.9		55.2		41.4		31.2		18.8		8.3		1.7		10.7		207.2	3.6
MISCELLANEOUS															2.0		2.0	0.1
SUB – TOTAL	105.2		122.9		188.1		115.1		45.6		67.2		25.0		63.0		732.1	12.8
UNPLANNED																		
CHARGE – DISCHARGE					2.7		0.3						1.3		4.5		8.8	0.2
PRODUCTION TEST	2.5				0.1		1.5						11.4		0.4		15.9	0.3
RUPTURE REMOVAL			11.3		14.7		6.2										32.2	0.5
WATER LEAK	36.5		5.0		21.8		30.2		15.8		16.0						125.3	2.2
MAINTENANCE	8.4		8.5		1.7		7.4		6.3		9.8		2.0		3.5		47.6	0.8
INSTRUMENTATION																		
PANELLIT											0.5				9.8		10.3	0.1
MISCELLANEOUS	1.2				3.4												4.6	0.1
SUB – TOTAL	48.6		24.8		44.4		45.6		22.1		26.3		14.7		18.2		244.7	4.2
TOTAL	153.8		147.7		232.5		160.7		67.7		93.5		39.7		81.2		976.8	17.0
NO.SLUG RUPT. (ALL TYPES)			1		1		1										3	
NO.NEW TUBES INSTALLED	3		0		74		7		0		3		0		1		88	
TYPE OF WATER LEAK – TUBE	1		0		1						1		0		0		3	
VAN STONE	1		0				1				0		0				2	
Helium Used – M-Cu. F.	245.4		498.1		366.8		283.6		658.5		515.5		250.6		239.1		3057.6	

(1) Continuation of August scheduled outage.

BM-5000-0[illegible] (12-58) AEC-GE RICHLAND, WASH.

MONTH: September 1960

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.	1486-C	Hot Spot	11.3	7-9-60	9-23-60	577	KJ-239-D			X		
I&E Reg.	1960-D	Hot Spot	14.7	6-9-60	9-24-60	640	VL-037-D			X		
I&E-E	0684-DR	Mech. Damage	6.2	9-8-60	9-25-60	118	SH-208-D		X			

BM-5000-051 (12-58) AEC-GE RICHLAND, WASH.

MONTH
September, 1960

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.	17759		4251		2633	2823			27466
TO FILTER PLANT (BLDG.183)	GPM AVG.	66936		79790		81181	82400	178700	173000	662007
TO FILTER PLANT (C&DR)	GPM AVG.	100496		58623						159119
TO R & E (KER) &FEO	GPM AVG.			203				536		739
TOTAL	GPM AVG.	185191		142867		83814	85223	179236	173000	849331
TOTAL	M GAL.	8000.2		6171.9		3620.8	3681.6	7743.0	7473.6	36691.1
RESERVOIR WATER (BLDG.182)										
TO POWER HOUSE (BLDG.184)	GPM AVG.	39		63		131	40			273
TO COND.SYSTEM(BLDG.190)	GPM AVG.	-		1488		2084	2783			6355
TO COND-SYSTEM (190DR & 183F)	GPM AVG.			2700		418				3118
TO EXPORT SYSTEM (incl. NPR)	GPM AVG.	17720		-						17720
TOTAL	M GAL.	767.2		183.6		113.7	122.0			1186.5
FILTER WATER (BLDG. 183)										
TO POWER HOUSE (BLDG.184)	GPM AVG.	162		160		110	151			583
TO PROCESS (BLDG. 190)	GPM AVG.	73490	81050	66646	68383	79063	78100	174412	169168	790312
TO 108	GPM AVG.	2800	4800	222		1096	1270			10188
TO 108DR	GPM AVG.			222						222
TO FILTER PLANT (BLDG. 183DR&B)	GPM AVG.		11757	10740						(22497)
TO F & S SYSTEM	GPM AVG.	122		361		335	152		50	1020
TO R & E (KER)& FEO	GPM AVG.			153				230		383
BACKWASH	GPM AVG.	2119	2889	1286	980	577	2727	4058	3782	184180
TOTAL	M GAL.	3399.5	4341.4	3446.9	2996.5	3507.0	3559.7	7719.8	7473.6	36444.4
PROCESS WATER (BLDG. 190)										
TO REACTOR	GPM AVG.	73090	80650	66246	67983	78663	77600	172000	166000	782232
TO REACTOR	GPM NOR.	85000	95800	85000	83700	85000	85600	179800	181600	881500
POWER HOUSE (K AREA)	GPM AVG.							40	12	52
105 (KE - KW)	GPM AVG.							1909	2756	4665
TO R & E (KER)	GPM AVG.							63		63
BUILDING USAGE	GPM AVG.	400	400	400	400	400	500	400	400	3300
TOTAL	M GAL.	3174.8	3501.4	2879.1	2954.1	3415.5	3373.9	7534.6	7308.1	34141.5
RIVER DATA										
ELEVATION (MSL.FT.)	(MAX.)	390.1		381.9		368.6	373.9		384.5	
	(MIN.)	387.4		379.2		365.3	372.0		380.8	
	(AVG.)	388.9		380.8		367.5	373.0		383.2	
TEMPERATURE	AVG. °F	64.8		66.0		67.3	66.9		64.8	

HW-66970

MONTH: September, 1960

REACTOR OPERATIONS STATISTICS — POWER

SHEET 2

		100-B	100-C	100-D	100-DR	100-F	100-H	100-KE	100-KW	TOTAL
WATER TREATMENT DATA										
AT BLDG. 182	MM GALS	-		-			-			-
BLDG. 183	MM GALS	2891.6	4341.4	3446.9	2532.5	3507.0	3559.7	7719.8	7473.6	35472.5
CHEMICAL CONSUMPTION										
CHLORINE (BLDG.182)	LBS.	-		-			-			-
(BLDG.183)	LBS	10896	24148	24070	17740	24550	32480	61000	58100	252984
	AVG PPM	0.4	0.7	0.8	0.8	0.8	1.1	0.9	0.9	0.8
(2) Aluminum Nitrate	LBS						163359			163359
	AVG PPM						(a) 22.6			22.6
(1) Aluminia		49376								49376
ALUM	LBS	11716	133703	156043	99441	133450	152401	312100	359700	1358554
	AVG PPM	8.7	3.7	5.4	4.7	4.6	(b) 6.8	4.9	5.8	5.6
SEPARAN	LBS	25	0	0	0	0	0	0	0	25
	AVG PPM	.001	-	-	-	-	-	-	-	.001
SULPHURIC ACID (AS 100%)	LBS	221965	293604	190868	160378	201947	124050	535700	516500	2245012
	AVG PPM	9.2	8.1	6.6	7.6	6.9	(c) 4.9	8.3	8.3	7.5
DICHROMATE	LBS	45800	46500	41009	42078	51260	51572	101400	97500	477119
PURGE MATERIAL CONSUMPTION										
SOLIDS	LBS	0	0	0	1250	0	0	0	0	1250

(1) Aluminia and alum combined for PPM average in alum column.

(2) PT-IP-347 A in effect on 9-16-60. PPM feed rates based on actual water treated (a) 868.3 mm gals, (b) 2,691.4 mm gals, and (c) 3,051.4 mm gals.

BM-8700-024 (9-58) AEC-GE RICHLAND, WASH.

MONTH: September, 1960

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	8.3	8.1	8.3	8.3	8.4	8.3	7.6	7.5
TURBIDITY	PPM AVG	3	3	5	4	4	5	5	5
FINISHED WATER									
pH	pH AVG	7.1	7.1	7.1	7.1	7.0	7.1	7.0	7.0
TURBIDITY	PPM AVG	.007	.010	.005	.005	.008	.006	.008	.007
Cl_2 RESIDUAL	PPM AVG	.05	.05	.08	.08	.06	.09	.06	.06
DICHROMATE	PPM AVG	1.74	(1) 1.60	1.80	1.80	1.80	1.80	1.80	1.80

STEAM DATA		100-B	100-D	100-F	100-H	B-D-F-H TOTAL	KE	KW	KE-KW TOTAL
GENERATED (MAX)	LBS/HR	183000	145000	145000	104000	577000	63000	58000	121000
(NOR)	LBS/HR	81000	81000	54000	56000	272000	-	-	-
(AVG)	LBS/HR	81300	81902	53545	55158	271905	39278	34711	73989
TOTAL	M LBS	58814	58970	38522	39714	196020	28280	24992	53272
TO PLANT	M LBS	49874	50006	33926	33677	167483	25452	22493	47945
COAL RECEIVED	TONS	2743	2689	1266	1766	8464	-	-	
CONSUMED	TONS	3127	3347	2211	2189	10874	-	-	
IN STORAGE	TONS	15647	19275	14189	16712	65823	-	-	
GEN.STEAM/LB.OF COAL		9.40	8.81	8.71	9.07	9.01	-	-	
OIL RECEIVED	GALLONS						635235	220662	855897
CONSUMED	GALLONS						259923	216042	475965
IN STORAGE	GALLONS						1055712	811566	1867278
GEN.STEAM/GAL.OF OIL							108.8	115.7	111.9

ELECTRICAL DATA			
TOTAL GENERATED KW HRS.	1601600	1652000	3253600
	161600	212000	373600

(1) ow PPM due to test run
PT-IP-321-A.

Peak Demand Control

DECLASSIFIED

DECLASSIFIED

C-6

HW-66970

BM- 5700-025 (9 -58) AEC-GE RICHLAND, WASH

APPLIED REACTOR ENGINEERING OPERATION

INDUSTRIAL ENGINEERING OPERATION

Program of Charge-Discharge Improvements

A program of charge-discharge improvement in the six older reactors was defined in June, 1959, and has been followed since then. Methods and time standards have been developed for all charge-discharge activity.

The procedure for charge-discharge using ram type charge seaters has been completed and is scheduled for performance test at 105-F building. The F Processing Operation will administer the test of the procedures with the aid of Industrial Engineering Operation personnel.

Prepare Training Films

A training film on rear face cap handling techniques has been prepared for presentation to Processing exempt and non-exempt personnel in B, C, D, H and F areas. The film has a running time of approximately 10 1/2 minutes.

Reactor Outage Reporting Procedure

An investigation is being made to devise a standard procedure for reporting outage time in all eight reactors. A recommended revision of the 105-D, DR Outage Reporting Procedure has been completed and distributed to interested personnel for their comments.

Methods Appreciation Course

The first three presentations of a four-hour, two session training course have been made to Manufacturing Supervisors and Specialists. It is expected the meetings on this subject will be completed for Processing personnel by mid-December, 1960.

Determination of the Base Painting Load in IPD

As requested by the Manager, H Reactor Operation, a five-year cyclic painting schedule is being prepared. This schedule is based on a visual inspection of buildings and installations to ascertain approximately what year they should be scheduled for painting. Historical data is being used to estimate the required number of manhours and material requirements.

In addition, a comparative cost estimate is being made using a synthetic standard. From the amount and type of painting that is performed, the man-hours and materials are established using Ramond Time Standards. A painting cost estimate will be derived from these labor and material figures.

Lead Reactor Installation, Fuel Element Material Handling, Work Area and C Elevator

Scope designs for lead reactor installation in 105-F Building are being prepared. Revisions are being made to eliminate high cost items from the original estimate.

Program for Improvements in Overboring Practice

Films taken of the overboring tests at F Reactor are being used by Mechanical Development engineers to assist in the development of efficient overboring tools. Industrial Engineering personnel will film the overboring of 5 channels at the next 105-F tube outage. The purpose of the filming is to establish a permanent record of the task performance for use as development and training tools.

Optimum Inventory and Usage of Dummies

A study is being made to consider the possibility of minimizing the types of dummies being used to cut the costs of these essential materials.

Rupture Methods and Time Standards

The establishment of a system of methods and time standards for removing rupture material has been suggested as a means to standardize and minimize the outage time used for this purpose. This study should reveal the best present methods and equipment, suggest new methods and equipment where improvements can be made, and provide times for the various tasks performed in the process of removing the rupture.

Radiation Monitoring Appreciation Course

At the request of the Processing Managers, a Radiation Monitoring Appreciation Course is being prepared for presentation to Processing exempt personnel. The objective of the course is to assist the Supervisors in guiding and training Radiation Monitors. Tentative planning indicates the course will be offered late December, 1960, or early January, 1961.

MAINTENANCE PRACTICES OPERATION

Spare Parts Inventory

The Irradiation Processing Department portion of the spare parts inventory was $1,750,647 as of September 30, 1960. During the month, revisions to spare parts inventory were as follows:

Decrease		$58,577
Increase		
Plants	$44,277	
Projects	3,735	
		48,012
Over-all decrease		$10,565

Several single items accounted for a large dollar movement: $39,500 increase for the third spare 4500 HP stator, and $28,460 decrease for Operational Charge-Discharge spare part disposition.

Maintenance Practices Operation is arranging for either rework or adjustment of 400 rear nozzle caps. These Stores items were found to be defective and negotiations are in progress to have corrections made, either by vendor or on-plant.

Helium Loss Reduction

A study is in progress to review the entire helium loss problem and develop recommendations for reducing losses. This includes review of system components and system operation, recommending improved operation procedures for unloading, addition, and purging, and methods of leak detection and leak correction. Initial work disclosed the feasibility of installing a gas purification and/or a rear face sealing system to permit reactor operation at minimum gas pressure. An engineering request is being prepared to request Facilities Engineering Operation to perform an engineering scope of this concept.

Personnel Elevator

A study was made of the 105-C metal loading elevator to determine if this equipment could be adapted to carry personnel. The increased use of splines and the attendant increase in personnel traffic to and from the elevator, indicated a need for a personnel elevator. The report recommended that the extensive modifications that would be required, both by elevator code and engineering, did not economically warrant revising the elevator. The most practical and economical solution would be to provide a new elevator for personnel service.

Front Face Piping and Fitting Study

The Front Face Piping and Fitting Study, which recommended improved front face hardware as a necessary step toward the return to the Dry Front Face Criteria, has been forwarded to Facilities Engineering Operation for action.

Reactor Tool Standardization

A study is in progress to investigate maintenance tool utilization at the various areas; primarily, reactor and outage tooling. The objective is to scope the problem and develop recommendations to standardize maintenance tools and equipment.

Third Party Inspection

One boiler, six pressure vessels, and one rear elevator were inspected by a representative of the Travelers Insurance Company during September.

Tube Replacement Problems

A study is in progress on the problem of pulling in replacement process tubes. Recent tube replacement outages indicate a problem area trend, difficulty in pulling in replacement process tubes and increased numbers of tubes which cannot be pulled completely into the reactor. This problem ties in with the graphite distortion and resultant short radius graphite

channels, relative inflexibility of the tube pulling mandril, and the friction of the process tube at the points of sharp graphite radius. It is probable that new tool development is required to achieve tooling which will perform channel straightening to correct two problems; tube pull-in, and tube damage from graphite abrasion.

4500 HP Motor Rewind Program - 190 Annex Buildings

Maintenance Practices Operation and Facilities Engineering Operation are collaborating on the 4500 HP stator replacement schedule to coordinate the plant work and vendor service shop work. Data has been collected and presented to management for decision in the location of select stators by correlating pumping plant capacities and reactor capabilities.

Maintenance Practices Operation initiated action with the vendor to assure that a vendor strike would not tie up coils and stator now at vendor's plant.

Service Manuals

The instrument service manual covering Project CG-791, was completed and distributed to engineers, supervisors, and instrument personnel.

Electrical service manuals on the reactor safety circuit and horizontal control rod systems are being prepared.

Instrument Evaluation

Four radiation monitoring systems are currently being evaluated by Maintenance Practices Operation's Instrument Engineer for the purpose of selecting a possible replacement for the obsolete equipment now in use. Two of the systems are HAPO developed, and two are vendor designed systems.

Standard Servicing Procedures

The inventory of all installed process instruments in Irradiation Processing Department is completed. The inventory is the first step in acquiring data necessary to formulate standard instrument service and procedures.

Craft Training

Maintenance craft training was provided on the following items:

Mechanical Craft

Nozzle Hardware: Two 6-hour training sessions were attended by 29 mechanical maintenance personnel.

Flexible Front Face Connectors: Two 2-hour training sessions were attended by 24 mechanical maintenance personnel.

Tool Balancer: One 2-hour training session was attended by 25 mechanical maintenance personnel.

Powder Actuated Tools: A 2-hour training session was given 6 mechanical personnel.

Instrument Craft

Theory and Application of Automatic Controls: Nine 4-hour training sessions were attended by 6 instrument trainees.

Safety Specialists' Activities

A formal investigation was held September 9, 1960, of the incident involving the J. A. Jones Company personnel who were working in the downcomer of the 105-B Building. The accident was caused by inadequate ventilation, which resulted in heat exhaustion of two employees.

The Safety Specialists participated in reviewing plans for remodeling sections of the 1706-KE Building.

The Golden Shoe Award pins and certificates were presented to three employees of 100-D, DR Reactor Operation.

Material was procured and distributed throughout Irradiation Processing Department for Fire Prevention Month activities.

PLANT EQUIPMENT ENGINEERING OPERATION

Bumper Fuel Element Program

Modified nozzles were installed as scheduled on D Reactor to support Production Test I-262-A-11-FP, "Evaluation of Projection Fuel Elements for Use in Ribbed Process Tubes". Approximately 20 of the scheduled 100 tubes were charged with bumper elements. Difficulties encountered with fuel-process tube interference resulted in charging machine failure.

B-C REACTOR OPERATION

OPERATING EXPERIENCE

Power level was limited at B Reactor in consideration of tube power and at C Reactor for control of rupture potential. Production was interrupted at B Reactor for repair of water leaks, both internal and external, and at C Reactor for removal of a ruptured fuel element.

EQUIPMENT EXPERIENCE

Subsequent to modifications for increased flow capacity of the B Reactor downcomer, pressurization of the 105-B effluent water junction box and a resultant periodic discharge of water from the far rear riser vent has been experienced. Facilities Engineering Operation is studying this problem.

Three leaking process tubes were replaced at B Reactor. Gas leakage from five front gunbarrel bellows was stopped by injections of silicone foam. Three displaced mattress plates were reinstalled in the 105-B discharge chute liner; new holding clamps are being fabricated to eliminate plate movement as a result of slug impact.

An increase in the number of leaking, rear face nozzle connectors at C Reactor was partially corrected by installation of a modified elbow at each of 281 connectors; the modified elbows employ double "O" rings to seal nozzle connections.

Burned-out chamber drive motors were replaced at G- and H-hole chambers of the C Reactor low level neutron monitor system.

Replacement impellers, with wear rings welded to their hubs were installed in the pumps of No. 2-C and No. 4-C process pumping units at Building 190-C; worn impeller assemblies were shipped to Los Angeles for rebuilding by the vendor, Byron Jackson Pump Company. No. 11-C pump was subjected to a capacity test to determine actual performance of the third-generation impeller installed in July, 1960. Test data indicated actual pumping capacity to be insignificantly less than specified in design criteria.

IMPROVEMENT EXPERIENCE

New bayonet-type inserts being tested as shields at vacant tube channels apparently reduce the front-face neutron levels at B Reactor by a factor of 1.8.

A conveyor was installed on the D elevator at B Reactor to speed the handling of rear nozzle caps.

Alum feed was increased from the average 6.8-7.2 ppm to 20 ppm on a half-plant basis at 183-B in conjunction with initiation of Development Test No. IP-357-A. HW-66736 describes this water treatment study aimed at reduction of P^{32} in reactor effluent water. No adverse effects on reactor operation are apparent after two full weeks of test operation.

A new material (hypalon) is being tested at B Reactor as a sealant of gas leaking breaks in the neoprene seal.

In connection with vertical safety rod operating difficulties at C Reactor, a traverse target has been designed to aid in inspection of the VSR channels; estimates of fabrication costs have been requested. Design work continued on a VSR channel drill and a jack for reseating displaced graphite blocks now partially obstructing the VSR channels.

Installation work continued on the Bauxite feeder system at Building 183-C with completion scheduled for early October.

Installation of replacement cables and conduit in the secondary electrical supply system to the 183-B pumping facility was completed and the system returned to normal service.

The Columbia River monitoring system was completed during September; river level and water temperature at a point one mile downstream from Priest Rapids Dam is transmitted by telemetering equipment to continuous recorders at Building 183-B.

RADIATION MONITORING EXPERIENCE

Two Maintenance Operation employees, assigned to tube burial, encountered dose rates of five r/hr as results of malfunction of a cask door opener.

[redacted]

D-DR REACTOR OPERATION

OPERATING EXPERIENCE

Operating levels at both reactors were limited by bulk outlet temperatures and non-equilibrium conditions. A scheduled outage at each was for tube replacement at D and block discharge at DR. Both reactors experienced a water leak and a rupture.

During the scheduled outage at D Reactor downcomer modifications and Ball 3X revisions were made. Sleeved and overbored nozzles were installed for the bumper fuel element program and 12 columns charged with the bumper slugs.

EQUIPMENT EXPERIENCE

Two of the 73 tubes replaced at D Reactor were replaced twice because of damage from stuck charges caused by graphite distortion. Twenty-eight tubes were probe tested to determine the extent of the distortion.

Downcomer revisions at D Reactor consisted of enlarging holes in trays and removal of down pipes which connected alternate trays. Crossover piping back pressures and downcomer venting problems are yet to be resolved.

A cracked motor shaft on the transfer area crane at DR kept the unit out of service for a week before replacement was made with a motor from a 200 North area crane.

Pump motors at 181-D and 190-DR were returned to service after coil failure by removal of the damaged coils. Off-plant shipment for permanent repair is scheduled.

IMPROVEMENT EXPERIENCE

PT-IP-262-A Bumper Fuel Elements - The final four columns of 1.47 per cent enriched material were discharged, demonstrating a factor of improvement of 38 over normal I & E material at a confidence level of 95 per cent.

Improved Gas Analysis Instrumentation - A gas chromatograph installation was completed in 115-D for use of D Reactor. Initial operation has been satisfactory and personnel are being trained in operation and maintenance of the system.

All of the 4500 hp pump motors in the 190 buildings have been equipped with open bus-bar type electrical connections in place of taped connections. The new equipment is expected to save 8 hours each time a motor is replaced or repairs made by the coil cutting method.

RADIATION MONITORING EXPERIENCE

No radiation overexposures occurred during the month.

[redacted]

D Reactor had one and DR Reactor three lapses of radiation control during the month.

Surface dose rates inside the D Reactor downcomer were reduced from 300 mrads/hr to 40 mrads/hr by decontamination with Sulfam-1 solution, preparatory to the modification work. Venting problems, arising after the work, caused dose rates up to 13.5 rads/hr 10 feet from a flapper valve in the vent line. Use of the near DR effluent line for venting, as a corrective measure, caused background increase at DR when vapors emitted from the DR near downcomer vent.

F REACTOR OPERATION

OPERATING EXPERIENCE

The operating level of the reactor was controlled by the bulk outlet temperature limits for the greater part of the month; the remainder of the time the level was controlled by tube power.

EQUIPMENT EXPERIENCE

Sixty tubes were probologged, of which three were found to have severe corrosion requiring them to be removed from service. Two other tubes were also removed after they were determined to be leakers.

Seven 190 pumps and motors were in service at start-up on September 3. The eighth unit was placed in service on September 7, during reactor operation, after a damaged coil in the No. 5 motor was bypassed.

Work was continued on restoring the reactor zone temperature system and included replacement of 11 resistance temperature detectors. Three faulty reactor thermocouples were repaired, however, 13 additional failures occurred during the month. Other instrumentation activity included replacement of 31 Panellit gages.

An investigation of the 60-inch effluent line established that the pipe was moving through the concrete anchor. Measurements indicate the line has crept approximately one-half inch in the last two months. A method of correcting this condition has been developed which should prevent potential damage to the 107-F basin inlet.

IMPROVEMENT EXPERIENCE

The 105-F high tanks' discharge lines were descaled on September 1 with an inhibited sulphuric acid solution, and drawdown tests demonstrated a 20 per cent improvement in water flow resulting from this operation.

The bulk chlorine feed facility was completed and placed in service on September 8.

A rubber sealing agent and rejuvenator was applied to approximately 63 per cent of the rear face neoprene seals to reduce reactor gas losses.

Points 5 and 6 of the new temperature deviation recorder are currently being used to print outlet water temperatures. This permits the reactor operator to know the bulk outlet temperature at all times.

Design Change No. 368-F, "Ball 3X Extra Low Pressure Switches," was completed.

A new type weatherproof cord cap was installed on each of the reactor building storage area hoists to reduce water damage.

A 1750 watt, 220 volt duratest mercury arc light was installed for underwater lighting test purposes in the storage basin.

RADIATION MONITORING EXPERIENCE

Three lapses of radiation control were sustained during the month. No exposures above applicable working limits were involved. Three cases of personal contamination up to 4,000 c/m were incurred during spline removal operations. All were readily reduced.

H REACTOR OPERATION

OPERATING EXPERIENCE

Equilibrium power levels reached 1675 MW. Bulk outlet effluent water temperature prevented further increases.

The reactor was shut down on September 6, to permit descaling of the high tanks in order to improve their water flow characteristics.

EQUIPMENT EXPERIENCE

Twenty-four process tubes were probologged to determine wall thickness. All of the tubes were acceptable for continued service. A total of 665 tubes have been probologged to date, of which 495 were second-generation tubes.

Production Test IP-347-A, "Use of Aluminum Nitrate in Place of Aluminum Sulphate for Water Treatment," was started on the west half of the H filter plant on September 16, with a feed rate of 12 ppm. The aluminum nitrate feed rate was gradually increased until September 21, when a feed rate of 28 ppm was attained, a rate sufficient to control pH to 7.0 without supplemental acid feed. No difficulties have arisen to date with the aluminum nitrate feed; however, the filtering rates on this side of the plant were relatively low (4.5 gpm/sq. ft.).

A new type broach (approximately 18 inches longer than the present broaches) was used on three channels to alleviate the tube insertion problems. Based upon the initial success of the broach, additional testing in its use will be conducted during the planned tube removal and replacement during the October scheduled outage.

IMPROVEMENT EXPERIENCE

An experimental 750 watt "Fluormeric" lamp is being used for underwater lighting at the metal pick-up chutes. The results of one month's operation were so encouraging that four additional units have been requested.

The length of the downstream dummy pattern was increased by eight inches. This revision moves the active zone upstream by eight inches, which better centers the flux in the rod pattern and results in better rod control.

RADIATION MONITORING EXPERIENCE

During the month, there were no lapses of radiation control or radiation occurrences.

CENTRAL MAINTENANCE

Descaling of the high tanks at H Reactor was successfully concluded during the first week of the month. Total initial flow was increased 1,100 gpm -- from 10,800 to 11,900 gpm.

[redacted]

KE-KW REACTOR OPERATION

OPERATING EXPERIENCE

Power levels of the reactors were limited by the rupture control point with the exception of two days at KW Reactor when graphite temperatures were the limiting factor.

A time operated efficiency of 94.5 per cent was the major factor contributing to the production record for a 30-day month achieved by KE Reactor. The one KE Reactor outage was caused by a steam leak in KER Loop 3 at a flared joint near the expansion loop thermocouple block on the front face of the reactor. The leak was caused by stress corrosion cracking of the tube sleeve due to stress corrosion.

EQUIPMENT EXPERIENCE

The Number 1 generator at 165-KE was temporarily removed from service when abnormal oscillations of excitation were detected. The cause was determined to be poor commutation on the pilot exciter due to insufficient brush pressure. Replacement of the brush springs corrected the oscillation problem. Plans were made to examine the brushes of the other generators.

Storage tanks, pumps, heat exchangers, piping and unloading platforms of the caustic and silicate chemical feed systems no longer in use at 100-K were removed in preparation for transfer to 100-N.

IMPROVEMENT EXPERIENCE

The second low lift pump motor to be rewound for 1500 H.P. capacity was installed in the Number 2 low lift pump at 165-KE. The motor was placed in operation at the present pump load capacity of 900 H.P. pending the installation of a larger capacity pump unit for increased coolant water flows.

The performance and maneuverability of the charge seaters was improved by changes to the air control system and elimination of unnecessary valves and piping. As a result, the seating of newly charged metal columns was made safer and more positive.

RADIATION EXPERIENCE

A defective seal permitted drainage of water that served as a radiation shield for irradiated poison splines in the "C" elevator pit. As a result, nine operators of a charging crew on the elevator received higher than planned radiation exposures. An investigation was held and steps were taken to prevent recurrence.

OC Schroeder

Manager
Manufacturing Operation

OC Schroeder/

[redacted]

FACILITIES ENGINEERING OPERATION

REACTOR MODIFICATION DESIGN

RESEARCH AND DEVELOPMENT

Administration of the downcomer model testing program at Washington State University has been transferred to the Research and Engineering Operation. The transfer was made to shorten channels for communication with the University.

A design study is progressing to define the scope and modifications required to provide adequate coolant backup facilities for three Reactor Modification Program cases: 1) a continuity of operation and safety case, 2) an expansion case, and 3) an interim case. Details, including earthquake protection, are being studied further.

A report has been received from Mr. G. R. Rich, Consulting Engineer, following his evaluation of the export water system. His recommendations are : 1) that use of existing surge suppressors continue but that their operation be modified for pressure actuation rather than electrical actuation, 2) that additional slow-closing air valves be installed near the pump discharge manifold, and 3) that testing continue to determine the need for additional air relief valves. Additional information has been requested from Mr. Rich since his recommendations were not sufficiently detailed to permit design of the proposed modifications.

DESIGN PROJECTS

CGI-791 - Reactor Confinement

Overall design is 99.5 percent, and detail design, 99.0 percent complete. Detail design extended past the target completion date of September 1, due to the inability to obtain vendor information on the 105-K Reactor exhaust fan diesel drives. The design criteria for Phase III have been approved by the Project Representatives.

The testing program has been completed except for the Environmental Component Testing and the Development Tests for field checking the filter banks. This latter test is to develop the procedure and equipment for field checking the integrity of the filter banks after installation. The aerosol generators have been fabricated and are now being calibrated to measure the aerosol spectrum. The smoke photometer has arrived on site and is being calibrated.

CGI-839 - Modification of Fuel Element Test Facilities 1706-KER

Drawings for the KER loop liner motor pumps have been returned unapproved to the vendor. Several deviations from the original specifications were proposed. These are requiring extensive review. Objections were made to the vendor regarding the design of the electrical terminal lug for the 275 horsepower motor and for the method of installation of the pump heat barrier between the first stage impeller and the lower motor radial bearing housing since this design is contrary to pump specifications.

The drawings and construction specification for the 1706-KER addition have been revised to include comments received from the Atomic Energy Commission. Both have now been approved and transmitted for contract preparation.

A design test has been initiated to evaluate several nozzle-to-process tube and nozzle-to-nozzle cap high temperature and pressure seals. The seals will be evaluated as alternates to the presently used solid metal O-ring.

The design criteria and scope drawings defining the revisions to improve the KER safety circuit have been prepared and transmitted for comment. This revision will exclude the 1706-KER control instrumentation as part of the safety circuit, but will expand the safety circuit to a complete three channel system.

CGI-844 - 100-K Coolant Backup System

Detail design is 10 percent complete. Specifications for the steam turbine and gear units for the 190-K Main Pump House, the pump and gear units for the new diesel pump house, and the modifications to the Navy surplus diesel engines have been approved.

Design of the diesel pump station portion of this project has been assigned to the Spokane, Washington office of H. E. Bovay, Jr. Engineers by the local Bovay Office. This split in work location has required several visits to Spokane to check design progress and discuss questions of scope significance.

CGI-883 - Increased Process Water Flow - 100-K

Detail design is 33 percent complete. The design criteria have been approved by the Project Representatives.

Requests for purchase of engineered material have been transmitted for the 13.8-4.16 KV load tap changing transformers and 4.16 KV voltage regulators, Building 151-K grounding resistors, and motor control centers for the 181-K River Pump House.

A requisition has also been prepared for the purchase of new low lift pumps. Originally it was intended that the low and high lift pumps would be purchased as a set; however, on-site testing indicated a satisfactory low lift pump, but that an acceptable high lift impeller has not been developed. A study has been completed regarding the feasibility of installing the new low lift pumps in the 190-K Main Pump House prior to the completion of the electrical modifications. Preliminary results indicate it is technically feasible to make these changes; however, precautions will be required to insure that the emergency electrical system is not overloaded.

CGI-884 - Rear Face Crossunder Lines B, D, DR, F, and H Reactors

Scope design is 90 percent complete; detail design 80 percent. Scope drawings for the crossunder line installation at the 105-F Reactor have been transmitted for comment.

EQUIPMENT DEVELOPMENT OPERATION

EXISTING REACTOR WORK

Remote Rear Face

The actuator and TV equipment now installed under the rear elevator in KE reactor continued to function satisfactorily. No evidence has been observed of degradation of the TV signal. New seal designs have been tested in the laboratory for both the ball valve and the flapper valve. Test quantities of both types of valves with new seals are being prepared for the next outage. In an effort to reduce valve cost, a new flap valve design, designated Mark VI, has been made and castings have been ordered offsite for prototype fabrication. A partial assembly of a balanced hydraulic charging machine intended for use with the remote rear face equipment for charging during operation has been assembled and given a preliminary functional test.

Overboring

Several tests of a machine designed to bore out the cast iron thermal shield and in-board do-nut have been made which demonstrate weakness in the mechanical feed part of the equipment. The existing machine was designed to permit a 200 mil overbore at C reactor. Modifications are being designed for it to permit its use in a preliminary 550 mil overbore test. Meanwhile, we have negotiated a contract with Norfin, Incorporated, of Seattle, to build two new dual boring machines as second generation prototypes to be used in a planned 550 mil overboring test at C.

Expansion Hardware

A number of front and rear nozzle assemblies designed for 200 mil overbore have been received and subjected to preliminary laboratory testing. One front assembly which incorporates a check valve was tested to obtain an indication of potential charging damage to be expected in charging fuel elements through the check; no damage was found in preliminary tests. The front assembly was also tested for pressure drop and found to exhibit less than half the pressure drop characteristic of the present hardware. Field Auxiliaries developed for us a programmed welding device which has proved to be very efficient in welding a small gunbarrel flange to the centering flange to effect a fixed gas seal.

Instrumentation

Initial installation of an effluent temperature distribution display was made at KE reactor.

All equipment for off-reactor test boring to demonstrate boring of shield holes for the octant monitor system has been assembled. Initial testing which should have been complete was delayed by the pipefitter strike.

Bumper Slug Charging Machine

The bumper slug charging machine was used in an attempt to charge bumper slugs into D reactor. It failed because greater than expected tube curvature was found. The machine stalled out after charging 18 slugs and, on the last tube attempted, was broken in an abrupt stall with 130 lb. air pressure. It has been returned to the shop for repair.

NEW PRODUCTION REACTOR WORK

NPR Fittings

Development work was completed and recommendations made to Process Design on the rear tube to nozzle joints. The recommended joint is a three-grooved rolled joint on the basis of all testing to date. Two nozzle closures have also been found satisfactory and appropriate recommendations have been made. An entirely satisfactory front tube to nozzle joint has not yet been established.

Instrumentation

Principal instrumentation activities continued to be design review rather than development, as development personnel assisted in the preparation of nuclear instrumentation specifications and in the review of flow monitor proposals, in addition to more routine review of other drawings and specifications.

Design Tests

Design Tests 1063 - Dynamic Visual Monitor; 1074 - Ball Level Detector; and 1078 - Grout Seal Assembly are completed with the issuance of final reports. Initial tests were performed on an expanded version of Design Test 1067 - NPR Dump System Evaluation - which is being run concurrently, as far as that is possible, with the new series of Process Tube Rupture Tests. Design Test 1081 - Sealing Plug for Inlet Barrier Wall Penetration - was received.

PLANT ENGINEERING OPERATION

DRAFTING OPERATION

Summary of services provided by the Drafting Operation is as follows:

New Engineering Drawings	163
Revisions, Layouts and Sketches	65
Microfilm prints reproduced	361
Microfilm drawings added or retired	4509
Ozalid check prints reproduced	977
Customers serviced - Microfilm files	218
Customers serviced - Catalog files	39
Catalogs added to files	9

The new Thermofax reader-printer was installed this month. Except for a few minor adjustments required, the unit has performed very well. The reproductions of the microfilm drawings are larger than those produced by the previous unit and they are clearer. Four additional Thermofax reader-printers for installation in 100-B, K, D, and H Areas have been received.

WATER PLANT AND UTILITIES ENGINEERING

4500 HP Motors

Preparation of the overall program for rewinding 36 of the 4500 HP motors is underway. In pursuance of this program, the first motor is currently in the General Electric Shops (Portland, Oregon) being rewound.

At the request of the Maintenance Manager, assistance was given to 100-D Maintenance Operation in the testing and repair of #2 DR 4500 HP Motor after failure of a coil in A phase. During the A.C. overpotential test made after isolation of the faulted coil, a coil in B phase failed at 13 KV. It was then recommended that the first coil in C phase also be isolated to minimize phase transients. This was done and the unit was successfully returned to service.

Assistance was given to 100-F Maintenance Operation in the testing and repair of 4500 HP motor #2 190-F after failure of a stator coil. The faulted coil was isolated and the motor successfully returned to service.

Transformer Capacity B, D, F Filter Plants

Several proposals were made and studied to provide increased transformer capacity at the 183 Filter Building at 100-B, D, and F Areas. Electrical load at these buildings exceeds the rating of one transformer (300 KVA) when and if the second transformer is out of service. Proposals include methods of economically obtaining 5000 KVA capacity. A study is underway to determine if existing 3000 KVA transformers can be uprated sufficiently.

Effluent Decontamination

The first test run of the pilot plant for effluent decontamination with aluminum turnings was terminated after about 800 hours. A review of test data of the initial run furnished by the Hanford Laboratories Operation conducting the tests indicates good confirmation of the parameters and assumption used for budget studies for a full-scale unit. Data from the second run, at higher flow rates, is not yet available.

Columbia River Studies

River flows followed forecast rates except for a few days when flows were reduced to completely sur-charge the reservoir at Coulee. Re-evaluation of storage by the Federal agencies indicating that there was plenty of water available, has resulted in Bonneville Power Authority increasing flows. This results in improved cooling conditions at Hanford. Continuing cold weather in Canada has reduced melting and the river flow is expected to continue a normal slow fall.

Test Supporting Coal Contracts

Acceleration tests were made at the 184-D Power House to determine the comparative performance of Independent Coal Company and Northern Pacific Railroad Company coal. It was determined that these coals can be adequately handled by our equipment, but that a considerable variation in technique would be required for ideal performance. These and previous tests also indicate the need for further study of the instrumentation in order to best assure required steam backup.

Emergency Personnel Shelters

At the request of Hanford Operations Office, Atomic Energy Commission, a review of emergency personnel shelter requirements was made and order-of-magnitude cost determined. The basic premise for this review was that adequate emergency cooling would be maintained at all reactors unless plant facilities were destroyed. Time did not permit a thorough engineering evaluation and optimization of all factors, but sufficient information was developed to point out fruitful fields for study in evaluating adequacy of plant facilities for emergency operation.

Rear Crossheader Expansion Joints H Reactor Building

As reported earlier, the principal rear face hardware problems which threaten continuity of operation result from vibration and thermal stress. Installation of a crossheader expansion joint is under study as a means of reducing rear header vibration and thermal stress. Production Test Authorization PT-IP-356-AE, "Rear Crossheader Expansion Joints, 105-H Reactor, HW-66650, has been prepared to authorize a test of an expansion joint on one header at 105-H.

PROJECT ENGINEERING OPERATION

PROJECTS

CG-706 - Installation of Improved Reactor Gas Instrumentation - 100-B, C, D, DR, F, and H

Beneficial use of the equipment was obtained at 105-D on September 18, 1960. Beneficial use has not yet been obtained at 105-DR and H.

CGI-791 - Reactor Confinement

An accelerated target schedule for beneficial use, as proposed by the AEC, has been set up. This provides for beneficial use of 100-F Area by October 21, 1960, and of all areas by January 20, 1961. The J. A. Jones Construction Company has been requested to provide an estimate of additional costs which will be incurred to meet the accelerated schedule.

Phase I - Fog Spray

An order was placed for the new dual differential countrate meters on September 23, 1960. This order was not placed as previously reported because of drift problems reportedly encountered on similar meters in use elsewhere on the plant. These were investigated prior to placing the order.

Phase II-B - Filter and Sample Buildings

Acceptance testing has been in progress along with the completion of construction work at 100-F Area since September 19, 1960. This "piecemeal" approach was agreed to in an attempt to finish the work in this area as soon as possible. Problems involving the sealing of the ventilation fan housing and gasket seals around the cell cover blocks have not yet been solved. Work is approximately two percent behind schedule on this phase of work.

Phase III - Ventilation Modifications and Tie-ins

The work stoppage by the CPFF pipe fitters lasted from September 19 to October 2. Work by other crafts, particularly electrical, continued satisfactorily.

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

Formal acceptance testing on this prototype equipment was started September 19, 1960, at Monitor Systems, Inc., Fort Washington, Penna.

CGI-861 - Expansion of Electrical Distribution Systems - Buildings 105-B, D, and F.

The purpose of this project is to design, procure and install equipment to modify and adequately expand the 105-B, D, and F electrical distribution systems. A Work Release was issued to J. A. Jones, and construction of the concrete outdoor transformer pads was started at 105-B during the week ending September 30. Transformers for the new substations have been received.

CGI-883 - Increased Process Water Flow - 100-K Area

The second rewound primary pump motor was received on plant September 26, and installed on primary pump No. 2 located at 190-KW on September 29.

MJA's 21, 25, and 29 - Pressure Monitor Repairs and Modifications - 105-C, KE, KW, and H

During this month the GE buyer visited Panellit, Inc., to review the purchasing aspects of this work. A bid package was subsequently received on September 28 and is being evaluated.

MJA-8 - Ball 3X Electrical Modifications - 105-B, D, DR, F, and H

The purpose of this MJA is to modify and upgrade the Ball 3X electrical systems at 105-B, D, DR, F, and H Reactors. Prior to this report, work had been completed at 105-B, F, and H Reactors. Work was completed at 105-D during an outage September 12 through 16, 1960.

PROJECT PROPOSALS

Project Proposals Returned Unapproved

CGI-887 Critical Mass Monitoring All Hanford 105 Buildings (Returned to General Electric Company on September 20, 1960, for re-evaluation of scope.)

CAI-892 Ventilation Improvements - 181 Buildings (Returned to General Electric Company September 13, 1960, without action. Recalled because of higher priority projects of greater mutual benefit.)

Project Proposals Approved

None.

Project Proposals Submitted to AEC

CGI-865 Rev. 1 Continuous Air Monitoring All Reactors (Directive in preparation for extension of physical completion date to November 30, 1960.)

CGI-910 Process Tube Hot Cell, 105-C

Other Projects Awaiting AEC Approval

CGI-824 Rev. 2 Remotely Operated Tube Closure Device, KE Reactor (Formerly "Remotely Operated Cap Remover, KE Reactor.")

CGI-844 Rev. 1 100-K Area Coolant Backup (For remaining requested funds, $1,865,000)

CAI-868 Rev. 1 Columbia River Scale Model

CGI-883 Rev.2 Increased Process Water Flow, 100-K Area (For remaining requested funds, $4,773,000)

CGI-889 Effluent System Modifications - 100-B/C (For remaining requested funds, $451,000)

CGI-900 Modification For Use of Self-Supported Fuel Elements - C Reactor.

Requests Received for Project Preparation

CAI-868 Rev. 2 Columbia River Scale Model

CGI-865 Rev. 1 Continuous Air Monitoring - All Reactors

R-29089 Analog to Digital Converter System for Temperature Monitoring - B, C, D, DR, F, and H Reactors.

R-29133 Instrumentation for Graphite Stringer Thermocouples - Existing Hanford Production Reactors.

CPFF CONSTRUCTION SERVICE CONTRACTOR - LIAISON

We have issued five new work orders and supplemented five project releases for a total of $528,600 to J. A. Jones in the month of September.

The J. A. Jones fitters walked off the job at noon September 19, 1960, over a jurisdictional dispute with the sheetmetal craft on hood work in 200 Areas.

PLANT FORCES WORK REVIEW

The Labor Standards Board approved two jobs for assignment to Plant Forces, which are estimated to cost $88,637.

MANAGER
FACILITIES ENGINEERING OPERATION

RT Jessen:dgm

NPR PROJECT OPERATION

PROCESS DESIGN

Research and Development

Physics calculations for a superheat feasibility study for an NPR type reactor have shown that enrichment does not vary significantly for lattice sizes smaller than ten inches. Calculations thus far indicate a possible configuration of a ten inch lattice with a 12 rod UO_2 cluster enriched to about 3-1/2 percent in a stainless steel process tube approximately 2-1/2 inches in diameter. The individual fuel rod will be about 1/3 inch in diameter.

Analytical and design activities on an evaluation of a Russian Superheat Reactor are under way. Design data and operating parameters have been developed based on an extrapolation of the limited information available. Systems based on this design data are to be generally envisioned so that capital and operating costs for the plant may be developed.

NPR conversion studies are concentrated on an up-dating of the Federal Power Commission report. Preliminary studies of the NPR lattice with oxide fuel elements reveal no physics limitations which would prevent fuel exposures considerably higher than 10,000 MWD/T.

Project CAI-816

Simulation of primary loop emergency dump engineering is now under study. Purpose of the test is to determine final maximum temperatures permissible so that minimum dump tank dimensions can be determined. Tests to date indicate no evidence of excessive vibration up to tank water temperatures of 180°. There is no evidence of steam escaping from the surface of the water even at the higher tank temperatures indicating that the tank size can be held to a minimum.

At the request of the Atomic Energy Commission, both General Electric and Kaiser Engineers have made estimates of cost and schedule to set up and run tests of a primary coolant pump and drive in the field. The studies were made to provide information needed by the AEC in considering the advisability of testing the pumps and their drives in the field and the extent of the pump testing in the factory. Based on the current construction schedule, it was estimated that a full power test at rated primary conditions could be started in the first quarter of 1962. General Electric estimated a cost of $320,000 to install equipment and run a one month field test. For a similar test, Kaiser Engineers estimated an expenditure of $473,000.

The proposal to install the decontamination equipment in 109 Building has received General Electric scope approval. Appreciable capital cost savings are possible due to reduced piping runs and the elimination of the decontamination building.

Project CAI-816 (Continued)

The Phase II superstructure bid package for the 105 and 109 Building was released to Kaiser Engineers on schedule. This large bid package contained over 1000 separate design items prepared by Burns and Roe and General Electric.

The most recent developments and the latest mechanical, hydraulic, control and electrical drawings prepared by AMF Atomics during the system analysis and scope design of the Fuel Element Handling System were reviewed and discussed. Some additional work and clarification will be required on the control drawings to make them compatible with the mechanical drawings and Hanford requirements. A final review of these items and the over-all package contents is contemplated before the AMF Atomics issues the final report on Phase I (System Analysis and Scope Design).

A vendor pre-proposal conference on flow monitoring was held August 2, 1960. Technical proposals were received on September 6, 1960. Thirteen proposals were received and evaluated as to vendor qualifications, engineering ability, manufacturing ability and technical design. A technical team of NPR assigned personnel has started a series of vendor conferences at HAPO and at the vendor plants to obtain additional technical information to allow selection of vendors to produce prototypes for evaluation. Placement of the production order will be based on prototype evaluation.

DEVELOPMENT AND TESTING

Listed below are significant developments for the New Production Reactor primarily reported by the Equipment Development Operation of Facilities Engineering.

A backlog of desirable tests has accumulated which need to be performed in the Component Test Loop necessitating the establishment of priorities. Early in September, the Component Test Loop was used to cycle fittings designed to test closures, Grayloc connector couplings, rolled zirconium tube joints, and Grayloc-type zirconium tube-to-nozzle joints. Late in the month, the Component Test Loop was used to perform primary loop dumping tests needed to size the proposed energy dissipator. Components were assembled to permit the resumption of process tube rupture testing early in October.

Results of cycling test fittings on the Component Test Loop include: (1) a spiral wound gasketed assembly (asbestos and stainless steel or Inconel) utilizing a small tongue-and-groove seal seat configuration has been recommended for nozzle closures; and (2) some leakage has been observed at Grayloc-type zirconium tube-to-nozzle closures which requires extension of testing; one assembly fabricated by Gray Tool Company and employing a standard Grayloc seal ring did not leak, whereas a second assembly made at Hanford leaked and a third assembly fabricated by Gray Tool Company but employing a non-standard seal ring with a larger inside diameter (to minimize projections that could interfere with fuel element charging) also leaked.

Time response tests were performed on three Englehard clamp-on resistance temperature detectors in the Component Test Loop. In one series of tests the time lag was approximately ten seconds, of which the pipe wall contributed in the order of eight seconds. These data are considered order-of-magnitude and highly dependent on the internal flow velocity.

Nuclear Metals reported the successful fabrication of a three-inch pipe section of a coextruded zirconium to carbon steel joint. This test specimen will be shipped to Hanford for evaluation.

Progress on procurement activities that invoke prototype requirements include:

Technical discussions were held on September 12, 13, 14 and 15, 1960, with Chandler-Evans, Atwood and Morrill, Mason-Neilan, and Crane Company, the four companies selected to participate in the prototype program for process tube inlet valves and process tube diversion valves. The engineering content of these discussions was forwarded to Kaiser Engineers for inclusion in the documented award to each firm.

Thirteen engineering proposals were received on process tube flow monitoring. Only two vendors proposed electromechanical concepts to meet the high reliability requirements of the specification; all others proposed electronic systems. To date, no vendor has proposed a system that is completely satisfactory, though several proposals stand out from the rest. To date, the prototypic approach to flow monitoring appears to be justified and has accentuated the critical engineering decisions needed to obtain an optimum blend of required functions, desired reliability (circuit and component selection), and minimum cost. A letter to the Atomic Energy Commission recommending vendors to be included in the prototype flow monitor program is being drafted.

Recommendations were forwarded to Kaiser Engineers on September 16, 1960, for participants in the prototype program for process tube expansion bellows. It was recommended that five or six participants be included in the prototype program since (1) individual prototype costs would be small, (2) competition could reduce the price of the production order significantly, and (3) variations in proposals made it desirable to evaluate single and two-ply convoluted bellows and welded diaphragm bellows.

FIELD AND OPERATIONS ENGINEERING

Construction

105-N Building

All the elevator casings have now been completed except the one for the S elevator. This one has been driven to approximately elevation (-) 80 feet. When completed, this casing will be driven to approximately elevation (-) 95 feet.

Total concrete yardage placed in this building as of September 27, was about 8,400 cubic yards. The average placement rate during the period from August 24 through September 27 was approximately 126 cubic yards per working day.

The structural steel for the support of floor slabs has been installed in areas 1-A and 5-A.

Drainage piping and the penetrations for service and process piping below elevation (-) 16 feet are now about 90 percent complete. The embedded portion of the elevator hydraulic lines has now been completed.

The electrical grounding mat below the building is now essentially complete except for a few small areas which are awaiting final excavation and fine grading.

109-N Building

Approximately 1,580 cubic yards of concrete were placed in this building in the period August 24 through September 27. Total yardage to date as of September 27 is about 4,410. Average placement rate during this reporting period for 105 and 109-N combined is therefore approximately 195 cubic yards per working day.

151-N Building

Concrete has now been placed for the floor slab columns and roof slabs. The basement floor slab and basement walls have also been completed.

153-N Building

The basement floor slab and walls are in place and forming is in progress on the ground level floor slab.

163-N and 183-N Buildings

Excavation, forming, and placing of concrete continued throughout this reporting period. The clearwell concrete is nearly complete.

166-N Fuel Oil Storage

Excavation work has been started.

181-N Building

Concrete has now been placed in about 50 percent of the operating floor slab. The subcontractor is currently installing penetrations for electrical, piping, etc., in the remaining 50 percent of this floor slab..

184-N Standby Power House

The outside wall footings and the boiler footings are in place. Work progressed during this period on the turbine generator supports, and footings have been poured for two of the fuel oil day tanks.

1734-N Building

The concrete block walls have been erected.

230 Kv Transmission Line - Project CAE-853

The subcontractor, Cleveland Electric, started work on this facility on September 19, 1960.

Graphite

Production machining of moderator details continues at a very low rate. Resolution of the notching operation is still being investigated by Kaiser Engineers with primary emphasis on modifications to the Arrowsmith machine. Contacts have also been made by Kaiser Engineers with other machine tool manufacturers in an effort to develop supplemental machining facilities for the notched details. Actual completion of finished details now stands at about 15.5 percent compared to the scheduled 34 percent.

The first carload of core material from National Carbon Company was unloaded at the 2101 Building on September 21. The balance of this order is scheduled at an approximate average rate of one to two carloads per week until completion.

Due to unacceptable purity tests from several heats of Great Lakes reflector material, the vendor has decided to gas purify all questionable heats. Of the approximately 2,800 bars remaining on this order, about half require this additional processing. The remaining half is now enroute.

Zirconium

The first trial run on one of the autoclaves was made on short pieces of zirconium process tube and coupon samples. The 38-hour run showed all material to exhibit a satisfactory oxide film with no staining attributed to the autoclave system. The test did disclose the need for more uniform heating between the top and bottom locations. Work toward this end is progressing. Final checkout of the acid etch station is being performed.

Progress at the tube fabricators is as follows:

Little progress has been made at Chase Brass during this period. This vendor has been working toward improved welding techniques.

All tubes on the Allegheny-Ludlum order are now at Tube Reducing Corporation waiting reducing and finishing operation. Approximately half are in the finishing operation.

Harvey Aluminum shipped approximately 50 tubes on the pilot order September 30, 1960. The remainder of the tubes are now being inspected with shipment scheduled for October 31, 1960, along with the first lot of 30 production tubes, which have been cold-drawn and are being conditioned preparatory to inspection. Progress on the production order is ahead of schedule.

Primary Loop

To help reduce to a minimum the total time required to process shop and erection drawings and procedures and reports, submitted for approval by the primary piping subcontractor, the following procedure has been initiated:

All approval data, except items of a contractual nature, will now be submitted by the contractor directly to General Electric. General Electric will process these items in cooperation with Burns and Roe, Inc. and will return processed material directly to the primary piping subcontractor with appropriate copy coverage to Kaiser Engineers. This procedure eliminates the time delay of the intermediate steps of receipt and return of approval data through Kaiser Engineers, but in no way changes the responsibilities, contractual or administrative, of the parties involved.

Burns and Roe assigned a metallurgist to Richland for fifteen days to work jointly with General Electric personnel to expedite the processing of approval data submitted by the primary piping subcontractor. During the period, 93 items were processed and returned to the subcontractor. In addition, the Burns and Roe representative jointly participated with General Electric personnel in several meetings to orientate interested parties, including lower tier contractors for the primary piping system, in the requirements of the specification.

A resident Liaison Engineer has been located in Richland by Burns and Roe. His duties will be to work with the General Electric Primary Loop Engineer in maintaining close surveillance over the primary loop constructor's activities affecting the Architect-Engineers' interests and project responsibilities. This move will serve to expedite the completion of the engineering effort and approvals required by contract and will insure that adequate provisions are made for conformance with applicable codes, standards, and contract requirements.

Procurement

Following is the status of procurement as of September 28, 1960:

[redacted]

Reactor Plant

General Electric Originated - Kaiser Engineers Purchase

59 Open Requisitions - Estimated Cost	$ 6,817,621
57 Open Purchase Orders - Actual Cost	1,891,088
3 Subcontracts - Actual Cost (2 combined with B&R)	10,682,223
16 Complete Purchase Orders - Actual Cost	89,923
	$19,480,855

General Electric Originated - GE or AEC Purchase

3 Open Requisitions - Estimated Cost	$ 204,500
8 Open Purchase Orders - Actual Cost	12,870,181
	$13,074,681

Heat Dissipation Plant

Burns & Roe Originated - Kaiser Engineers Purchase

53 Open Requisitions - Estimated Cost	$ 6,375,300
37 Open Purchase Orders - Actual Cost	11,335,921
14 Subcontracts - Actual Cost	13,675,107
Holding 6 Requisitions (lock sets)	-
2 Complete Purchase Orders - Actual Cost	55,694
	$31,442,022

NPR Related

General Electric Originated - Kaiser Engineers Purchase

5 Open Requisitions - Estimated Cost	$ 25,300
6 Open Purchase Orders - Actual Cost	40,568
4 Purchase Orders Complete - Actual Cost	56,391
	$ 122,259

Total - All Orders	$64,119,817

Administration

The following material was issued by Drawing and Specification Control during the month:

[redacted]

Routine Work Processed from August 22 through September 18, 1960

Drawings	873
Specifications	52
Criteria	28
Requisitions	74
ATP's	7
Other	68
Total	1,102

Reviews were completed and formal comments were offered on engineering materials as follows:

On Detail Drawings	150
On Specifications	20
On Scope	11
On Criteria	0
On ATP's	6
Total	187

Operational Planning

Work was initiated on developing standard source cards on which to log equipment data. These cards are the initial step in equipment description preparation.

A document covering safety system operation is in preparation. This will be utilized to check design and serve as a basis for maintenance procedures.

A review of the assignments of responsibility, authorities, and working agreements between NPR Project and Manufacturing Section related to operational start-up activities was initiated. Arrangements will help to assure proper distribution of charges by both components for these activities and for transfer of personnel or of their services between components to obtain the best use of operating experience and of acquired N-Plant background.

CONSULTING ENGINEERS

The data supplied by the General Electric Company for the original FPC Report was reviewed and the results of the review recorded in HW-67003 to be transmitted to the AEC.

The evaluation of the Beloyarsk Russian superheat reactor is proceeding on schedule. Design criteria have been prepared for a single reactor unit with a rating of 318 eMW. The physics of the reactor are being studied for fuel exposure levels of 2300, 5000 and 10,000 MWD/T. Discussions are to be held with the Architect-Engineer employed by the Atomic Energy Commission to study the power generating facilities of the several conceptual reactor plants in Milwaukee, October 12-14, 1960.

PROGRAM EVALUATION

Design Status

	Wt'd. Total	Certified Schedule	Actual % Complete
Reactor Plant as of 10/1/60			
Title I			
Scope		100	99.7
Title II			
Drawings (No. incr. from 2100 to 2200)	70	74.0	78.2
Specifications	8	92.0	75.7
Requisitions	8	32.0	25.9
ATP's	4	17.0	9.1
Development and Testing	10	75.0	71.0
Total	100	70.0	70.3
Heat Dissipation Plant as of 10/1/60			
Title I			
Scope Criteria		100	98.5
Title II			
Detail Design		65.0	79.0

	Req'd	No. Issued to 9/17/60 Scheduled	Actual
Criteria	23	23	21
Preliminary Drawings (bid)	717	564	575
Detail Drawings (for const.)	726	329	390
Specifications (bid)	165	99	110
Requisitions	176	106	117
ATP's	-	0	0

Composite Design Completion as of 10/1/60 (Reactor and Heat Dissipation Combined)	Certified Schedule	Actual % Complete
Total	72.0	77.5

Cost Estimate

The last project cost estimate was issued on June 30, 1960. See the July record report for summary.

[redacted]

Schedules

On September 6, 1960, the AEC directed Kaiser Engineers to proceed with placement of 105 Building superstructure concrete using Kaiser Engineers forces. The letter further instructed that electrical work, embedded pipe and reinforcement steel placement is to be by fixed price subcontractors, "to the greatest extent practicable." The entire 109 Building superstructure, except final setting of process equipment, pipe insulation and finish painting, will be by fixed price contract.

During the month of August, AEC issued Revision 1 of the Certified Construction Progress Schedule.

MANAGER
NPR PROJECT

JS McMahon:mf

[redacted]

FINANCIAL SECTION

GENERAL ACCOUNTING SECTION

During September, five IPD employees attended professional society meetings and IPD received a refund for a trip taken in August. The net cost (total less the refund of $143.61) was $514.17.

Provision was made for the quarterly Equipment expenditure pattern and PA&C midyear review September 21, 1960.

The annual physical inventory of Reactor and Other Special Materials was taken as scheduled on September 29, 1960.

PRODUCTION COST & BUDGET SECTION

Work In Process Inventory at June 30, 1960, was priced at current rates for comparison with book values. Minor discrepancies in the method of preparing the AEC Product report were discovered and changes recommended.

The "Distribution of Power Cost" document issued monthly was revised to present the same information in a condensed form (2 pages vs 10 pages) without a sacrifice in quality.

Essential Material and Frozen Lunch inventories were observed in H Processing on August 25, 1960.

PERSONNEL ACCOUNTING

Total number of personnel assigned to the Department at month end is 2,260 a decrease of 15 from the previous month.

During the month, suggestion awards aggregating $934 were paid to Department employees. Calendar year to date awards aggregate $5 185. Authorized allocation for 1960 is $11 875.

AUDITING

The absence and injury records pertinent to the 79-day period ended at midnight September 19, 1960 were examined. Nothing was found to prevent the Department from achieving the fourth consecutive HAPO General Manager's Safety Award.

S H Small

Manager-Finance
IRRADIATION PROCESSING DEPARTMENT

SH Small:vjr

RELATIONS PRACTICES OPERATION

Three technically trained candidates were interviewed with no offers extended. Two previous offers were rejected and three offers remain open at month end including one to a PhD. Three employees transferred into the Department from other HAPO components and one from GE-Schenectady. One monthly employee transferred to Contract and Accounting Operation. Four exempt employees went on leaves of absence-- two returned to school and two entered military service.

A total of $145 was paid to 15 suggesters for 16 suggestions. The largest award was $30.

Communications included publication of nine Management News Bulletins, one Round Table Guide, four Headliners, and seven priority messages. GE NEWS coverage included seventeen items about IPD activities totaling 244 column inches.

Six security violations occurred during September. One hundred and eight medical treatment injury cases were treated during the month. The Department completed 6,835,000 man-hours in 564 days without a disabling injury. At midnight 9-19-60, IPD attained its 4th consecutive General Manager's Safety Award. Selections have been completed and orders placed with Stores.

W. A. Shanks

SIGNIFICANT REPORTS ISSUED

Number	Class'n.	Author	Date	Title
HW-66787	Conf.-Undoc.	L. M. Keene	9-20-60	Scope of Work - Contract DDR-111 Downcomer Orifice Plate and Crossheader Expansion Joint Tests-100-K Area.
HW-66746	Unclass.	E. L. Etheridge	9-12-60	Development Test - Field Test Equipment for Testing the Integrity of Filter.
HW-SA-1988	Unclass.	H. W. Heacock	9-15-60	The Existing Reactor Confinement Program at Hanford.
HW-66774	Secret	P. H. Hutton	9-22-60	Reactor, Plant Engineering Short Range Program in Support of Reactor Operating Continuity.
-	Unclass.	J. H. Fastabend	9-12-60	Status Report - NPR Fitting Development Activity.
-	Unclass.	J. H. Fastabend	9-21-60	Trip Report - NPR Tooling.
HW-66735	Unclass.	R. G. Colwell J. R. Spink	9-8-60	DT-1074 - Ball Level Detector Test Report.
HW-66739	Unclass.	R. G. Colwell J. R. Spink	9-8-60	DT-1078 - Grout Seal Assembly Test Report.
HW-66783	Unclass.	E. Hollister	9-14-60	Progress Report, Octant Monitor Drilling Test.
HW-66804	Unclass.	H. F. Jensen	9-16-60	Report on Chemical Descaling of 105 Reactor High Tank Piping.
HW-66815	Unclass.	E. Hollister	9-19-60	Poison Spline Use Study and Recommendations.
HW-66540	Unclass.	A. J. Lindsay	8-17-60	Comments on HWS-6511, Control Rod Position Indication System.
HW-66619	Unclass.	A. J. Lindsay	8-13-60	Final Report - DT-1063, Evaluation of Dynamic Visual Monitor.
HWS-7973	Unclass.	A. N. Iverson	9-14-60	Specification for In-Core Gamma Flux Detector Assembly.

Number	Class'n.	Author	Date	Title
-	Unclass.	A. J. Lindsay	9-14-60	Status Report - Flow Monitor Prototype, DT-1069.
-	Unclass.	Instrument Development Operation	9-12-60	Report on Analysis of Flow Monitoring Proposals Submitted on HWS-6507, AEC Request 5921-1160 (7-27-60).
HW-66823 RD	Secret	E. C. Wood E. R. Astley J. H. Brown L. W. Lang	9-17-60	Major Overboring of Reactors.
HW-64676	Unclass.	R. J. Mollerus	9-19-60	H Area Trip-Out Incident of 3-11-60, Potential Ground Failures.
HW-57036	Unclass.	G. E. Wade	8-31-60	105-N Design Criteria - Fission Product Confinement System.
HW-65656	Unclass.	M. H. Russ	9-21-60	Heat Dissipation System Project Representative Minutes No. 59.
HW-65657	Unclass.	M. H. Russ	9-23-60	Heat Dissipation System Project Representative Minutes No. 60.
HW-66716	Unclass.	R. B. Willson	8-31-60	Project CAI-816 Monthly Design Test and Development Status Report for August.
HW-66637	Unclass.	D. D. Stepnewski	8-30-60	Trip Report - A. D. Little and GEL.
HW-66656	Conf.	F. J. Mollerus	9-15-60	Preliminary Report - NPR Post Scram Primary Coolant Thermal Contraction.
HW-66651	Conf.	J. Muraoka	8-31-60	NPR Process Tube Flow Distribution During Emergency Coolant.

Number	Class'n.	Author	Date	Title
HW-66697	Unclass.	G. T. Haugland	9-6-60	NPR Thermal Shield Boron Steel - Trip Report.
HW-66840	Unclass.	W. J. Love	9-23-60	Reactor Steam Release Within the Core.
	Unclass.	W. J. Love	9-20-60	Trip Report - G.E. Reactor Safeguards Council Meeting.

TRIPS

Name	Firm & Location	Date	Purpose
J. W. Nageley	Westinghouse Electric Willamette Iron Co., Portland, Oregon	9-2-60	Review the motor re-winding contract which is part of the work included in CGI-883, Increased Process Water Flow, 100-K Area.
D. F. Watson	H. E. Bovay, Jr. Spokane, Washington	9-1-60 9-26-60	Discuss CGI-844 design.
D. F. Watson	Freightliner Corp. Portland, Oregon	9-9-60	Discuss trailer suspension systems for CGI-791.
C. E. Jones	Air Mac, Inc. Yakima, Washington	9-13-60	Inspect straddle lift trailer and discuss shock absorbing problems.
A. McDonald	Westinghouse Corp. Portland, Oregon	9-2-60	Assist Project Engineering on inspection of a re-wound Westinghouse motor.
H. A. Kramer	Grand Coulee Dam Grand Coulee, Wash.	9-2- & 9-26-60	Measure thermocline.
H. A. Kramer	Priest Rapids Dam Priest Rapids, Wash.	9-1, 12 & 19/60	Calibrate the river flow and temperature telemeter.
J. H. Fastabend	Machine Tool Exposition & Production Engineering Show, Chicago, Illinois	9-13-60 thru 9-17-60	To discuss NPR tooling.

Name	Firm & Location	Date	Purpose
J. H. Fastabend	Hydraulic & Air Equipment Co., Iron Fireman Manufacturing Co., Ingersoll-Rand Co., and Omark Industries. All of Portland, Oregon.	9-13-60 thru 9-17-60	To discuss NPR tooling
C. A. Munro	Union Machine Corp., Seattle, Wash., & Nordick Manufacturing Co., Kent, Wash.	9-19-60 thru 9-20-60	To discuss overboring.
R. L. Jeffery	American Manufacturing Co., Tacoma, Wash.	9-23-60	To discuss modification of a piece of equipment.
E. A. Wegener	Machine Tool Exposition & Lovejoy Flexible Coupling Co., in Chicago, Ill.; Great Lakes Carbon Co., in Morgantown, N. Car.; Spear Carbon Co., in Niagara Falls, New York; National Carbon Co., in Cleveland, Ohio.	9-13-60 thru 9-23-60	To discuss universal coupling needs.
E. C. Frantz	Norfin, Inc., Seattle, Washington	9-29-60 and 9-30-60	To review fabrication of flapper valves.
G. L. Erickson	San Diego Scientific San Diego, California; Daystrom, LaJolla, Calif.; Engineered Electronics, Santa Ana, California; Walkirt Company, Inglewood, California; Anadex Instruments, Van Nuys, California; Breck Electronics, Monterey Park, California; Philco, Palo Alto, Calif.; Hydro-Aire, Burbank, Calif.; Network Electronics; Van Nuys, California; Electronic Components, Van Nuys, California; Sierra Electronics, Menlo Park, California;	9-11-60 thru 9-17-60	To evaluate breadboard approaches for differential input alarm modules for fuel rupture monitoring and manufacturers' capabilities with respect to these modules.

Name	Firm & Location	Date	Purpose
	Shockley Transistor, Palo Alto, California; Advanced Technology Laboratories, Mountain View, California.		
J. E. Kaveckis	Monitor Systems, Ft. Washington, Penn.	9-15-60 and 9-16-60	Review status of CGI-802 scanner.
J. E. Kaveckis	ASA-N6-5 Subcommittee, Philadelphia, Penn.	9-16-60	Participate in subcommittee meeting.
J. E. Kaveckis	Panellit, Inc., Skokie, Illinois	9-19-60	Review Panellit program and status on two channel electronic flow monitor prototype.
J. E. Kaveckis	General Controls Skokie, Illinois; Waterman Engineering Co., Evanston, Illinois; Fluid Power Accessories, Glenview, Illinois; W. A. Kates Company, Deerfield, Illinois.	9-19-60 thru 9-21-60	Discuss flow regulator requirements for fuel rupture monitoring.
J. E. Stice D. C. Keck	Todd Shipbuilding Co., Seattle, Washington	9-8-60 and 9-9-60	Discuss requirements of the 105 Building elevators.
C. D. Shadinger	Heath Manufacturing Co., Kent, Washington	9-15-60	Check operation of borescope examination stand.
C. E. Love	National Carbon Co., Clarkesburg, West Virginia	9-7-60	Review graphite production.
	Allegheny-Ludlum Steel Pittsburgh, Pennsylvania	9-8-60	Review zirconium tube production.
	Wolverine Tube Co., Allen Park, Michigan	9-9-60	Review zirconium tube production.
F. D. Collins	Star Machinery Co., Seattle, Washington	9-19-60	Review repair work on graphite fabrication equipment.
E. W. Wilson M. H. Russ	Burns and Roe, Inc. Hempstead, N. Y.	9-12-60 thru 9-16-60	Consult on heat dissipation plant scope and design preparation.

Name	Firm & Location	Date	Purpose
R. A. Rohrbacher	Burns and Roe, Inc. Hempstead, N. Y.	9-26-60 thru 9-30-60	Expedite heat dissipation plant instrumentation and control design.
J. F. Nesbitt	Frederic B. Stevens, Inc. Detroit, Michigan	9-22-60, thru 9-26-60	Outline and witness tests on ball system washer-dryer.
G. T. Haugland	Crucible Steel Pittsburgh, Pennsylvania A. M. Byers Company Pittsburgh, Pennsylvania Jones and Laughlin Steel Pittsburgh, Pennsylvania Kaiser Engineers Pittsburgh, Pennsylvania	8-26-60 thru 9-3-60	Determine possible sources of boron steel plate for the NPR thermal shield.
H. G. Johnson	C. H. Robins, General Electric Company, San Jose, California	9-28-60 thru 9-30-60	Obtain APED pressure suppression test data and discuss its application to design of NPR emergency dump system.
W. J. Morris R. B. Willson W. M. Harty	Chandler-Evans Corp. Hartford, Connecticut Atwood & Morrill Salem, Massachusetts Mason-Neilan Norwood, Massachusetts Crane Company Chicago, Illinois	9-12-60 9-13-60 9-14-60 9-15-60	Review and discuss prototype inlet and diversion valve program and answer questions concerning formal contract language and test procedures.
W. J. Love	Argonne National Lab. Chicago, Illinois	9-7-60 and 9-8-60	Attend Reactor Hazards meeting of G.E. Reactor Safeguards Council.
W. J. Dowis E. M. Kratz	Burns and Roe, Inc. Hempstead, N. Y.	9-8-60 and 9-9-60	Discussed the cases to be studied in the up-dating of the FPC report on the economic feasibility of NPR conversion.
W. M. Harty	Aerojet-General Azuza, California Barton Company Monterey Park, California	9-19-60 9-20-60	Technical discussions on engineering proposals on process tube flow monitoring.

Name	Firm & Location	Date	Purpose
	Swartwout Company Manchester, New Hampshire	9-22-60	
	Stromberg-Carlson Rochester, New York	9-23-60	
	Avien Company Woodside, New York	9-24-60	
R. W. Benoliel	National Carbon Co. Clarksburg, W. Va.	9-6-60 thru 9-8-60	Observe NPR graphite manufacture.
K. W. Norwood	Chicago, Ill.	9-6-9 '60	Attend GERSC Mtg.
J. H. Brown	Chicago, Ill.	9-6-10 '60	Attend GERSC Mtg.
R. E. Trumble	Chicago, Ill.	9-6-10 '60	Attend GERSC Mtg.
O. H. Greager	Chicago, Ill. Washington, D.C.	9-6-60	Attend GERSC Mtg. Attend Advisory Committee Mtg. on Biology and Medicine
W. R. Conley	Burns & Roe Hempstead, N.Y.	9-11-60 thru 9-16-60	Discuss NPR design
E. C. Bennett F. W. VanWormer	General Dynamics Corp. General Atomic Div. San Diego, Calif.	9-21-60 thru 9-24-60	Discuss MGCR irradiation in the DR-1 Loop
C. T. Hayner	Schenectady, N. Y.	9-26-60 thru 10-14-60	Attend Indirect Labor Measurement Instructors Class.
J. W. Green	New York, Boston & Chicago	9-26-60 thru 10-2-60	Attend Instrument Society of America meeting and visit instrument vendors.
T. W. Hauff	Cincinnati, Ohio	9-26-60 thru 9-28-60	Participated in a manufacturing training program district staff meeting.
	Dresden Station Joliet, Ill.	9-29-60	Discuss reactor operator training.
R. M. Smithers	General Electric Co. Schenectady & Waterford N. Y.	9-6-60	Discussion of recent developments in maintenance organization structure and performance measurement.
R. D. Nederhood	New York City	9-24-60 thru 10-2-60	Attended the Instrument Automation Conference.

VISITORS

Name	Firm & Location	Date	Purpose
Guy R. Coe	Vickers, Inc., Seattle, Washington	9-7-60	To discuss hydraulic power units and controls with J. H. Fastabend.
Richard C. Pugh	E. I. duPont de Nemours Wilmington, Delaware	9-7-60	To discuss coextruded zircaloy to stainless steel joints.
D. L. Snellman	Norfin, Inc., Seattle, Washington	9-27-60	To discuss Contract DDR-109 with C. A. Munro.
B. A. Pearson	Norfin, Inc., Seattle, Washington	9-28-60	To discuss Contract DDR-109 with C. A. Munro.
W. A. Kates	W. A. Kates Company Deerfield, Illinois	9-14-60 thru 9-16-60	Consultation of flow regulator prototypes.
J. C. Fryer	Fryer and Company Portland, Oregon	9-14-60 thru 9-16-60	Consultation of flow regulator prototypes
Harry E. Wilson	Wilson & Sprow Spokane, Washington	9-22-60	To discuss mailing of parts.
D. W. Leiby	General Engineering Lab. General Electric Co. Schenectady, New York	9-16-60	Review work on NPR Primary Loop Systems Analysis Program.
Dr. K. Garlid	University of Washington Seattle, Washington	9-12-60 and 9-13-60	Discuss problems in two-phase flow and transient heat transfer.
W. W. Barton R. Shustrin	AMF Atomics Greenwich, Connecticut	9-26-60 and 9-27-60	Discuss the mechanical, electrical, control and cost aspects of under-water fuel handling system.
R. Pugh	duPont Co. Wilmington, Del.	9-7-60 and 9-8-60	Discuss fuel element problems.
G. M. Roe	G. E. Research Lab. Schenectady, N. Y.	9-13-60 thru 9-15-60	Discuss optimization; consultation on reactor control problems.

Name	Firm & Location	Date	Purpose
H. H. Willis	Nuclear Metals, Inc. Concord, Mass.	9-21-60 and 9-22-60	Discuss NPR fuel elements.
W. H. Coleman	Fort Wayne, Indiana	9-19-60 thru 9-23-60	Consultation on Manufacturing Training program.

END

DATE FILMED

12/9/92