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MONTHLY RECORD REPORT

IRRADIATION PROCESSING DEPARTMENT

FEBRUARY, 1959

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By Authority of CG PR-2

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Compiled By
IPD Personnel

March 20, 1959

Received OSTI

AUG 03 1992

RICHLAND, WASHINGTON

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

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IRRADIATION PROCESSING DEPARTMENT
MONTHLY RECORD REPORT
FEBRUARY, 1959

SUMMARY

RESEARCH AND ENGINEERING OPERATION

Self-supported fuel elements charged in B Reactor have achieved 20 percent of the high exposure goal. Two columns were discharged for examination.

Six columns of fuel elements, four of them nickel plated, were charged into C Reactor to evaluate the effluent contamination problems associated with nickel plated fuel elements.

Irradiations of seven-rod cluster elements and rod-and-tube elements in the KER loops are progressing satisfactorily. The initial decontamination run in the KER Rupture Loop was completed successfully. Radiation levels from 200 to 8000 mr/hr were reduced to from 0 to 20 mr/hr.

Four samples of graphite irradiated at high temperatures in the MTR were discharged and will be returned to HAPO for test measurements. A second test was charged into the same position and additional samples are on hand for future charging in the MTR and the ETR.

As a result of the withdrawal of the ACRS administrative limits on power level, all reactor power levels were raised and limits were based on fuel element failure control.

Special irradiations of fuel plates were conducted for WAPD to provide data on heat generation necessary for determining arrangement.

PRODUCTION AND REACTOR OPERATIONS

Record production was achieved during February exceeding the previous maximum (established December, 1958) by 6.5 percent and forecast by 24.9 percent. Forecast was exceeded at all reactors and new production records were achieved at the DR and KE Reactors. Forecast was exceeded due to higher power levels and improved efficiency, the latter being partially due to shutdown cycling of the majority of the reactors to January and March.

A new maximum power level (combined total for all reactors) was achieved, exceeding the previous record by 805 megawatts. New maximum power levels were achieved at all reactors after discontinuing the ACRS limits late in January. Levels were increased at the C, H and KE piloting reactors 90, 150, and 175 megawatts, respectively, with increases at the other reactors ranging from 70 to 120 megawatts.

Overall time operated, 90.4 percent, was 3.2 percent above the previous eight reactor maximum and 10.4 percent above the February forecast. Efficiency was 9.5 percent above forecast at the six old reactors and 11.4 percent above at the K Reactors.

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The five ruptures removed from the reactors during February represents the best experience since June, 1957. Three of the February ruptures were at KE, I & E regular, and two were at H Reactor, I & E enriched.

Significant items of equipment experience were:

1. Thirty-five process tubes were installed, 28 at H Reactor and seven at C.
2. Two water leaks were corrected, a van Stone leak at C Reactor and a tube leak at H Reactor.
3. At B Reactor a front nozzle was broken on a PCCF tube when the C elevator was moved with the charging machine still connected. Irradiated dummies and poison pieces which were washed onto the elevator were removed without overexposure to personnel.
4. Tubes in the ball valve pattern at C Reactor were processed 62 times during operation without affecting operating continuity.
5. Five additional modified VSR's were installed at H Reactor completing the replacement program.

There were no disabling injuries or radiation overexposures. One security violation was incurred.

Processing and power statistics for individual reactor areas are tabulated on pages CH-1 through CH-5 of this report.

FACILITIES ENGINEERING OPERATION

As part of a task force review of K Reactor back-up systems, design study has been given to various methods of improving assurance of cooling continuity. Results are expected to influence scope of the K Water Plant Expansion Project.

Funds were authorized for total design and for first-phase construction of the confinement facilities for existing reactors. Fog spray system components were selected and requisitions issued with the objective of accomplishing installation at KE plant during their scheduled April extended outage.

Preparation and processing of NPR scope material continued during the month. Final consideration of primary loop material selection was initiated.

The Expansion Design Council and the NPR Project Representatives groups met regularly during the month. Four major scope items were approved and transmitted to the Commission.

Agreement was reached with Relations and Utilities Operation on the joint use of the 2101 Building. Renovation costs have been estimated at about \$375,000. Proposals for the production of pilot orders of zircaloy process tubes have been received from five vendors and are being evaluated.

Planning for operating and maintenance organization and manning continued. Forecasts of manpower requirements through 1962 were prepared.

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Organizational and staffing changes occasioned by the assignment of GE field responsibilities were being planned.

Fifty-one uranium columns were discharged and recharged while operating, without scrambling, at C Reactor using the charge-discharge-while-operating equipment.

Poison splines were used successfully at D and KW Reactors and equipment is being tested.

A scope report for the "Expansion of the 105-B, D, and F Electrical Distribution Systems" was issued and project proposal action requested.

A check list for the overhaul and inspection of elevators was designed, duplicated and distributed to interested people in IPD, CPD, and FPD.

Manuals were prepared and classes were started on the maintenance and operation of the poison spline system. Seven operators and three maintenance craftsmen have attended to date.

Progress on the scope of the 107 basin sealing program awaits test verification.

Efforts were continued to improve operating characteristics of the bauxite acid feeders.

Detail design of a cross-tie line permitting an increase in flow to 105-DR is being prepared.

Revised scope for 1706-KER loops is being prepared.

Construction was resumed on the recirculating gas-cooled test loop on February 6, based on the revised scope of starting up with helium gas.

Receipt of the new rotating elements for CG-558 process pumps is behind the promised schedule. Three were promised by February 1, and only two have been received to date. The vendor still promises to ship all replacements prior to July 1, 1959.

The vendor is fabricating replacement impellers for the CG-600, 100-C Alterations, process pumps. No schedule of shipment has been received.

Beneficial use has been obtained on the CA-696, Coal Car Shake-Outs, 100-B, D, F, H, and 200-W Areas project.

EMPLOYEE RELATIONS OPERATION

Exempt personnel placement continued at a high level during February with five experienced BS/MS technical people interviewed for openings in IPD; seven PhD candidates were interviewed resulting in two offers being extended and three more being prepared.

Thirty-six IPD employees earned 50 percent tuition refund for the first semester at the University of Washington Center for Graduate Study.

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Services available in the technical education area was discussed with E. C. Wanner, Consultant - Engineering Services, February 19.

The 1959 series of Understanding Human Behavior was started in IPD this month.

The fifth in the series of PBM-I courses in IPD began early in the month.

An additional daily mail delivery will be inaugurated in the 100 Areas March 2.

Mass communication activities included the publication of: Eight Management News Bulletins, one Round Table Guide, one Memo from the General Manager, one issue of a new publication, "IPD Employee Headliner," three OPG's, plus 175 column inches in the GE News. One Priority Message was received and disseminated and one Management Information Meeting was held during February.

The HAMTC has filed a "Charge Against Employer" with the NLRB regarding the "unilateral initiation" of the Pile Operators Selection Program on the premise that this practice represented a refusal by the Company to bargain on this promotional procedure.

Lunch relief practices for Power Operators was investigated by a Department of Labor representative at the request of the chief steward for the Operating Engineers.

HAPO Industrial Firemen have filed a lawsuit against the Company for "back pay" based on the allegation that the bus arrives at White Bluffs anywhere from 15 to 20 minutes before actual starting time of their shift, and during this period they perform "work" for the Company.

Notice of a desire to arbitrate a Radiation Monitor's grievance regarding overtime was received in February; however, the HAMTC has been informed that the Company does not regard this as an arbitrable issue.

One job assignment to plant forces was approved by the HOO-AEC Labor Standards during the month bringing the total of approvals to 127 since this procedure was initiated in IPD. Sixteen supervisors attended the "You and Labor Law" class presented February 9, 1959.

A report of salary comparisons covering semi-technical or non-professional job categories conducted among the larger Atomic Energy Commission Prime Contractors was received during February and will be used in the validation of the proposed evaluation plan and salary structure for non-exempt, non-unit salary study.

A concerted study was made of the relationship between Department, HAPO and Company salary statistics. A complete Performance Appraisal and Salary Review Program was decided upon to ensure careful control of salary action so as to obtain appropriate conformity to Company statistics.

There were no disabling injuries during February and the Medical Treatment Frequency compared favorably to the preceding month, the current frequency being 1.94.

A few former centralized functions of Safety and Fire Prevention are under study for the purpose of effecting proper dispersal at area level, i.e., handling of

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Award Plan, Statistical Data and Handling of Industrial Medical problems.

A comprehensive safety inspection of K Area was conducted during February. A similar inspection of B-C Area will be made in March.

IPD's Fire Department responded to two alarms in February: (1) February 4 - outer area, one-half mile southwest of underground storage - control burning by Road Maintenance got out of hand; damage was \$10. (2) February 12 - 100-H Area - 1760-H Building; accidental alarm - no loss.

FINANCIAL OPERATION

An ATH authorization was approved February 20, 1959 to Atomic Power Equipment Department in the amount of \$4,500 for engineering assistance and development study for "Rod Position Indicating and Logging System."

General Manager approval of personnel and overtime hour requirements was received on February 10.

The first quarterly report to share owners has been distributed to participants of the Savings and Security Plan.

Development studies were made concerning paperwork techniques to be used to facilitate the visual comparison of reactor data output from automatic recording equipment.

Verification was made of a portion of the health benefit payments made by Metropolitan Insurance Company to or on behalf of IPD employees during the month of January, 1958.

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IRRADIATION PROCESSING DEPARTMENT

MONTHLY REPORT OF INVENTIONS OR DISCOVERIES

FEBRUARY, 1959

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

Name

Title

V. G. Blanchette

Improved Telemeter Recorder Control System

AB Greninger
Acting General Manager
IRRADIATION PROCESSING DEPARTMENT

AB Greninger:plc

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RESEARCH AND ENGINEERING OPERATION

FEBRUARY 1959

VISITORS AND BUSINESS TRIPS

S. A. Bernsen, R. C. Howard, W. L. Kosiba, E. W. Sprenkle and R. A. Wolfe of the General Atomics Division of General Dynamics, San Diego, Calif., T. L. Dunkel of AEC, San Francisco, Calif., and D. G. Beasley of AEC, Washington, D.C., visited HAP0 to discuss the test proposal for the first Maritime Reactors Branch Test in the DR Loop, 2/5-6/59.

W. S. Randall, J. Reed and W. W. Kurtz of Leeds & Northrup Co., Seattle, Wn., visited HAP0 for discussions concerning water flow devices, temperature recording devices and turbidimeters, 2/19/59.

A. E. DeMers visited the University of Washington, Department of Surgery, Seattle, Wn., to consult regarding improvement in the method of delivery of U of W 104 material, 2/3-5/59.

E. C. Wood visited E. I. duPont de Nemours & Co., Wilmington, Del., Nuclear Metals, Inc., Concord, Mass., Knolls Atomic Laboratory, Schenectady, N.Y., and Westinghouse Elec. Corp., Bettis Plant, Pittsburgh, Pa., for discussions on NPR problems, 2/8-17/59.

J. F. Music attended a meeting on control rod materials, San Francisco, Calif., 2/11-14/59.

D. H. Curtiss visited the Tube Reducing Corp., Wallington, N.J., for discussions on zirconium process tubes, 2/15-21/59.

A. G. Blasewitz visited the General Elec. Co., APED, San Jose, Calif., to attend a radiation conference at Vallecitos Laboratory, the General Atomics Division of General Dynamics, San Diego, Calif. to discuss the DR Gas Loop Test, and the Westinghouse Elec. Corp., Bettis Plant, Pittsburgh, Pa. to discuss the KAPL-120-8 test, 2/16-25/59.

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B-1

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ORGANIZATION AND PERSONNEL

	<u>*Permanent</u>		<u>Rotational</u>	
	<u>Jan.</u>	<u>Feb.</u>	<u>Jan.</u>	<u>Feb.</u>
Management & Administration	5	5	-	-
Process & Reactor Development	42	43	3	3
Process Technology	35	35	2	2
Operational Physics	19	19	3	3
Irradiation Testing	21	21	1	1
Component Testing	18	18	0	0
Coolant Testing	26	26	0	0
	<u>166</u>	<u>167</u>	<u>9</u>	<u>9</u>

* Includes one engineer on loan

Process & Reactor Development: M. L. Smith, Engineer I, transferred from H Reactor Operation, IPD, 2/1/59. G. F. Owsley, Engineer I, transferred to Operational Physics as Supervisor, Pile Physics, 2/20/59. Nola M. Davey, Secretary, transferred from R&U, 2/16/59.

Operational Physics: R. O. Brugge, Supervisor, Pile Physics, transferred to APED, San Jose, Calif., 2/20/59. G. F. Owsley transferred from Process & Reactor Development as Supervisor, Pile Physics, 2/20/59.

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PROCESS AND REACTOR DEVELOPMENT OPERATION

Reactor Fuels

Present Reactor Fuels Technology

Delayed Quenched Cores

PT IP-179-A97-FP, "Evaluation of the Effect of a Modified Beta Heat Treatment Cycle on Dimensional Stability of Uranium Fuel Elements," HW-56429-C.

The two groups of columns scheduled out under this test at 700 and 900 MWD/T should reach goal during March 1959. The first group will, if necessary, be discharged slightly below goal in order that the dimensional stability data from this test may be utilized in predicting performance characteristics of the delay quench, blank heat treated material. The remaining eight columns will be available for discharge approximately one month later.

Projection Fuel Testing

Self-supported fuel elements under irradiation at B-Reactor have achieved approximately 20% of the desired goal exposure for the high exposure columns. Two columns were discharged and recharged for continued irradiation. The discharged elements were sent to the 105-C MEF for visual examination.

Bumper Fuel Testing: Fuel columns are available and will be charged into a K-Reactor as soon as production test coverage is obtained.

Nickel Plated Fuel Elements

Six columns of nickel plated fuel elements were charged during operation at 105-C under PT IP-207-A-3FP, "Evaluation of Effluent Contamination Problems Associated with Nickel-Coated Fuel Elements." Two each of these columns were electroplated, chemically plated and unplated to evaluate through effluent monitoring the activity build-up as a result of nickel corrosion. No samples have as yet been obtained.

NPR and Advanced Reactor Fuels Technology

Development of Co-extrusion Cladding Process

Fabrication and receipt of the KER size unenriched material has been completed. The quality of this material appears to be very good. Minimum variations in wall thickness of five mils was attained which is low enough to present no serious difficulty in applying end caps.

Enriched uranium for KER elements has been shipped from Hanford; part by way of Fernald for fabrication into extrusion billet components and the remainder directly to NMI for alloying with Zr. and subsequent fabrication to billets.

The required tools have been delivered to American Brass Company for extrusion of NPR size rod-tube and tube-tube elements. The first such extrusions are scheduled for March 13.

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KER Irradiation Program

KER Loop 1

KER Loop 1 contains Zircaloy-2 jacketed enriched seven-rod cluster elements to be irradiated to a goal of 4500 MWD/T. The objective of the test is to compare the behavior of elements with twenty and thirty mil Zircaloy-2 jackets, which are alternated in the tube and to measure the coolant temperature in the element flow channels to determine the amount of inter-channel mixing. This test will be followed by a charge of enriched tube-and-tube elements to compare the performance of two percent Zr-2 U alloy fuel relative to that of unalloyed uranium.

KER Loop 2

The irradiation of the four enriched Zircaloy-2 jacketed seven-rod clusters and one enriched Zircaloy-2 jacketed three-foot three-rod integral end closed element to a goal of 3500 MWD/T is continuing normally. These elements will be discharged at the KE extended outage in April, when the tube will be replaced to permit 300 C coolant temperature operation. Enriched seven-rod cluster elements are scheduled to be charged in this loop in May.

KER Loop 3

Twenty-five aluminum jacketed dip-canned depleted uranium fuel elements were charged in KER Loop 3 for irradiation until the KE extended outage in April. This test will evaluate the high temperature bond retention of dip-canned elements. After tube replacement during the extended outage, Loop 3 is scheduled to be charged with a high temperature aluminum corrosion test to establish the corrosion behavior at 290-300°C relative to that predicted from lower temperature irradiations.

KER Loop 4

The rod-and-tube elements now under irradiation will be irradiated to 2500 MWD/T.

Modification of 1706 KER Facility

The Preliminary Project Proposal for modification of 1706-KER is in the course of being approved internally in IPD.

Fuel Element Rupture Test Facility

A test facility for studying in-reactor failure characteristics of defected elements and for providing the necessary conditions for development of NPR rupture detection instrumentation was scoped for PRTR installation. The estimated cost of such a single pass system was estimated to be about 1.5 million dollars. Provision for recirculation can apparently be included for about \$150,000 additional.

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TABLE 1
PRODUCTION TESTS - FUEL DEVELOPMENT

Test Number	Type Metal	Tubes	Reactor	Goal Exposure	Current Exposure	Remarks
IP-56-A	Low Hydrogen Dingot U Elements	136	D, DR, F	Variable		Semi-production scale testing of low hydrogen dingot uranium fuel, solid and I & E
IP-81-A	BNTL Regular	245	D	Variable 500		Provide for quantity charging of BNTL elements. (Solid)
IP-82-A	Projection I & E Nat. Elements	13	B	400 & 600 800 MWD/T		Preliminary evaluation of self- supported fuel elements.
IP-93-A	Cast uranium I&E Natural	12	C	500 & 700 MWD/T	275 MWD/T	Preliminary evaluation of fuel elements fabricate with Cast uranium cores to evaluate dimensional instability.
IP-95-A	Lead Dip, 1.445"	7	D	800 MWD/T		Provides for corrosion Moni- toring of I & E elements in D-Reactor
IP-123-A	7-Rod S.S. jacketed 1.3% enriched clusters	1	KE	3500 MWD/T		Discharged Feb. 4, 1959 at goal.
IP-168-A	1.460" O.D. Natural I & E	4	C	Variable 800		Long term corrosion monitoring & refinement of operating limits.
IP-171-A	Solid M-388 & 1245 Clad Elements	12	B, DR, F	Variable 500	350 MWD/T	Provide for evaluation of alternate aluminum component vendors. Control columns are only ones carried special. Rest are lot charged.
IP-178-A	1.474" O.D. I & E Nat.	6	KE, KW	Variable 800		Provides for irradiation testing of KIII elements, water mixers and long term tube corrosion monitoring.

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TABLE 1 (cont'd)

Test Number	Type Metal	Tubes Reactor	Goal Exposure	Current Exposure	Remarks
IP-179-A	OIIN geometry, 45 sec. delay quenched nat. uranium.	16 C	700,900 MWD/T	500	Provides for testing to optimize heat treatment of I & E fuel elements.
IP-205-A	Zr-2 jacketed Rod-and-Tube elements.	1 KE	2500	900 MWD/T	Charged Nov. 18, 1958 in KER Loop 4.
IP-207-A	Nickel Plated CIIN Fuel Elements.	6 C			To evaluate the effluent contamination problems associated with Nickel Plated Fuel Elements.
IP-210-A	CIIE normal sorted as to Bond integrity.	30 C	Normal	300	Evaluation of relationship between Bond integrity and Hot-Spots.
IP-214-A	Zircaloy jacketed 1.6% Enriched 7-Rod Cluster elements & a 3-foot, 3-rod, Zr-2 jacketed, 1.6% enriched integral end closed cluster element.	1 KE	3500	1100	Charged in KER Loop 2 Dec. 9, 1958
IP-221-A	Zr-2 jacketed natural uranium 7-rod cluster elements	1 KE			Discharged Feb. 4, 1959
IP-226-A	Zr-2 jacketed, 1.6% Enriched 7-rod cluster elements.	1 KE	4500	800 MWD/T	Charged in KER Loop 1 on 15 Jan. '59.
IP-229-A	Dip canned al. jacketed depleted uranium solid elements; one doe thermocouple element.	1 KE	500 MWD/T	50 MWD/T	Test was charged Feb. 4, 1959 to evaluate high temperature uranium - Al-Si bond stability.

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Reactor Physics

Present Reactor Physics Technology

Measurements Evaluation Program

The justification for a production test to process through Redox two-ton batches of controlled irradiated I & E elements from H and K reactors has been scrutinized and evaluated. Prime justification for the test was to improve upon the accuracy of the product prediction equations -- the benefit to basic physics knowledge is quite low.

An alternative test is proposed which will enable single-tube, high exposure, well monitored irradiations and radially-dependent isotopic analyses to be carried out. Successful correlation of the data with theory will increase our knowledge of effective cross sections, effective capture to fission ratio of U-235, conversion ratios, initial production rates (g/MWD), and neutron balance as a function of exposure. Also benefiting will be the accountability techniques.

Plutonium Buildup Studies

An IBM-709 program utilizing a parametric solution of the plutonium buildup equations is now being prepared. Input data for the program will utilize subroutines presently being written for the IPD Lattice Parameter Program.

Reactor Instrumentation

In-Core Flux Monitor - Prototype testing of the driving mechanism of the TWFM was performed.

High-Speed Scanner Project CGI-802 - Epsco Incorporated was the successful bidder.

Zone Temperature Monitor Project CGI-666 - All electronics, zone cell monitors and display equipment have been installed in the six old reactors. New RTD's and leadwire were installed at 105-F, and the F-system has been set up for use with annunciation in case of system failure or temperature anomaly.

K-Reactor Panellit Coordinate Monitor System - Recent recognition of a potentially unsafe Panellit safety circuit trip configuration has required the removal of the Panellit coordinate identification system at the K Reactors. A study is being made to assess the problem and provide recommendations for system reinstatement.

Advanced Reactor Physics

NFR Flux Calculations

Preliminary calculations of the radial fast and thermal flux profiles for the NFR have been completed. Additional information is required on 1) longitudinal profiles, 2) primary fission gamma heat generation in

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shields, 3) heat generation in reflector, and 4) flux distribution of neutrons above 1 Mev. In terms of the central thermal flux in the reactor, ϕ_0 the slow (J_2) and fast (J_1) currents into the shields are as follows. All cases are for the 0.664" rod cluster fuel element.

Case	Calculation Method	File	J_1/ϕ_0	J_2/ϕ_0
1	Hand	1200 Tubes	5.05×10^{-5}	2.71×10^{-3}
2	Valprod	1200 Tubes	7.13×10^{-5}	3.55×10^{-3}
3	Valprod	1000 Tubes	3.35×10^{-5}	2.83×10^{-3}
4	Valprod	1200 Tubes Flattened	12.0×10^{-5}	5.88×10^{-3}
5	Valprod	1000 Tubes	4.24×10^{-5}	4.00×10^{-3}

Case 1 and 2 should give identical results, but the Valprod cases contained incorrect input data for the reflector and the results are therefore high. The results point out the following facts:

- 1) Adding 200 tubes increases the fast current incident on the shields two-fold and the slow current by a factor of about 1.2. This result reflects the decreased reflector thickness as tubes are added without changing overall stack dimensions.
- 2) Flattening the reactor in the radial direction increases the fast current a factor of 1.3 to 1.7 and the slow current a factor of 1.4 to 1.65.

For the 1000 and 1200 unflattened tube piles, the central thermal flux, ϕ_0 is calculated to be 17.8×10^{13} and 15.8×10^{13} n/sec-cm², respectively. The upper limit to the fast and slow currents incident in the thermal shield are 1.9×10^{10} and 9.4×10^{11} n/cm²-sec, respectively. Part of the increase is due to consideration of neutron streaming effects in the core which has the effect of flattening the flux. However, most of the increase is due to a significantly higher value for ϕ_0 .

NPR Fuel Criticality Calculations

Using Brookhaven measurements for buckling of small diameter enriched rods, the safe configurations of NPR cluster elements has been determined. Storage of the irradiated elements will offer little problem so long as close-packed configurations of individual rods (assuming breakup on discharge) can be maintained. The major criticality problem will exist during the discharge process in the basin where no control can be held over the local uranium-water ratio. Technical criteria are being prepared which will specify safe configurations for all foreseeable NPR fuel elements.

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NPR Heat Generation Rates During Operation

A detailed calculation has been made of the fractional heat generation in the NPR lattice cell for three different fuel elements over a range of 20-26 lbs/ft. The results are summarized in the table below for the graphite and process tube. Most significant of these results are that 1) good agreement is obtained with the earlier work, and 2) the graphite fraction is quite insensitive to fuel element size. The reason for the second result is that although less gamma energy escapes from the more massive elements, a compensating factor appears in that the less the water in the process tube, the greater is the fraction of fast neutron energy escaping into the graphite. A fixed process tube size must be assumed.

<u>Fuel Element</u> ^b	<u>#/ft</u>	<u>Mev/Fission</u> ^a	<u>% E_{pt}</u>	<u>% Graphite</u>
7-rod cluster(.664")	19.9	202.4 ± 3	.44 ± .03	4.55 ± .25
7-rod cluster(.733")	24.2	203.0 ± 3	.42 ± .03	4.48 ± .25
Tube and Rod ^c	25.6	202.9 ± 3	.40 ± .03	4.30 ± .25

a Sensible energy only.

b All dimensions are for bare uranium, all clad is 20 mil Zr-2.

c Tube diameters 2.32" x 1.40" rod diameter is 0.75".

Documents Issued

<u>Document No.</u>	<u>Class.</u>	<u>Title</u>	<u>Author</u>
HW-59090	Secret	Contraction Rates of H & K Reactors	C. R. Richey
HW-59128	Secret	Alternate Limitations for Governing the Charging and Discharging of Process Tubes During Operation	G.F. Owsley
HW-59133	Secret	Chemical, Physical, and Reactivity Changes in a Full Reactor EN Meltodwn	R. Nilson
HW-59075	Secret	NPR Heat Generation Rates During Operation	R. Nilson
HW-59164	Secret	The Effect of Hafnium in the Ball 3X Safety System	R. Nilson G.D. Joanou
HW-58099	Secret	Physics Optimization Calculations for Retubing B,D,F Files with Zr tubes	C.R. Richey
HW-58959	Secret	Request to determine Pu Buildup for 0.94% Enriched Metal	C.R. Richey

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Reactor Engineering

Present Reactor Engineering Technology

Zr-2 Process Tubes

Four proposals for the fabrication of 100 BDF ribbed Zircaloy-2 process tubes have been received, reviewed and additional information obtained from the fabricators. Negotiations were held with Tube Reducing Corporation for the redetermination of the PRTR and the BDF ribbed tube contracts. Various details of the contractual agreement were substantially agreed upon, although final arrangements must await the completion of arrangements between TRC and Allegheny Ludlum Steel for the extrusion work.

Agreement has been reached, although contractual arrangements have not been completed, with Mallory Sharon Metals Corporation and Superior Tube Company.

If Harvey Aluminum Company decides to amend their proposal from a best effort to a price redetermination type contract, negotiations with them will begin early in March.

Studies in Progress

Engineering studies now in progress include; the adequacy of K Reactor Cooling System and the effect of system and equipment modification upon the cooling adequacy, the initial and ultimate fuel dimensions for use in the ribbed BDF Zircaloy-2 process tube soon to be contracted for, and the possibility of exterior tube corrosion as a result of the use of nitrogen in the reactor atmosphere.

Advanced Reactor Engineering Technology

NPR Process Tubes

Five proposals for fabrication of NPR tubes have been received from Bridgeport Brass Company, Allegheny Ludlum Steel, Chase Brass and Copper Company, Mallory Sharon Metals Corporation, and Harvey Aluminum Company. Each company except Bridgeport Brass Company agreed to accept full responsibility for the metal. Harvey's proposal was the least detailed and definite. Sound proposals were received from each of the remaining. Each company had approximately \$100,000 worth of equipment to be purchased except Chase and Harvey. Chase proposed equipment costing \$650,000 and Harvey needs more unless Tube Reducing is used as a subcontractor. In this case a cost of \$35,000 is involved.

Currently no money is available for procurement of NPR tubes. Further evaluation and subsequent selection will be made early in March. A firm evaluation and recommendations will then be submitted to the AEC by the Expansion Operation.

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NPR Graphite

The high temperature test irradiation in the L-42 position in the MTR, GEH-9-7, was discharged February 2. The four samples of TS-GBF graphite was irradiated at 750°, 750°, 1050° and 975°C. After a short cooling-off period, the test capsule will be disassembled in the MTR hot cell and the samples returned to Hanford for test measurements. Data on these samples will extend the knowledge of the effect of temperature on contraction rate.

The next experiment, GEH-9-8, was charged into the L-42 position. It will be discharged on April 27. This capsule contains two TS-GBF and two CSF samples. The CSF samples were machined from a selected bar which will also be used for samples to be run in the ETR and in test holes in the Hanford reactors. This arrangement is being used to establish a correlation that will permit evaluation of ETR irradiation of samples of the new NPR candidate graphites to be conducted starting in May.

A spare assembly, GEH-9-9, containing samples of the new graphites is being assembled to be available for charging in the L-42 position in the event that the KAPL device scheduled for that location is not available for charging the last of April.

Construction at Hanford of the modified MTR L-48 shim rod is progressing rapidly on a priority basis. A prototypical head of this device is presently being tested at the MTR. The first modified rod test assembly may be charged as soon as April 6.

The test thimble for the first high temperature irradiation test of graphite in the ETR, GEH-13-1, is on-site at the ETR. This thimble contains samples of TS-GBF and CSF graphites. Data on these graphites will be part of the correlation referred to. This first thimble is scheduled to be charged on March 2. It will be irradiated for two months. The second thimble now assembled at Hanford will be shipped for charging about March 16. This will also contain TS-GBF and CSF graphites. Subsequent ETR thimbles will contain samples of the new graphites.

NPR Project Representatives

The following Design Criteria and Bases documents were approved for Research and Engineering during the month:

- 1) HW-57009, "Graphite Moderator Design Criteria."
- 2) HW-57014, "Ball Safety System Design Criteria."
- 3) HW-57039, "Electrical Systems Design Criteria."
- 4) HW-57044, "Design Bases, Part II: Functional Requirements of the Primary Loop Control and Instrumentation Systems."
- 5) SK-1-29006, "Standby Power House."
- 6) SK-1-29007, "Standby Power House."

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Radiological Engineering

Radiation Control Experience

A D-DR Maintenance Operation employee received an exposure in excess of 300 mr in five consecutive days at the DR Reactor. The estimated exposure was 300 mr. The badge showed 465 mr for the 4 week badge period during which very little exposure was received outside the five consecutive days. How the technical overexposure was received is not known.

Eleven Reports of Lapse of Radiation Control were issued during the month. There were two cases of spread of contamination to the skin or personal clothing of employees. There were three cases in which employees received uncontrolled exposure to radiation. One occurred when irradiated effluent gases collected in the storage area, another occurred when instrument lines were disconnected in the inner instrument room without shutting off the gas flow, and the third occurred when personnel entered a location containing a high concentration of irradiated reactor gas without adequate monitoring or any respiratory protection.

Other Lapses involved: 1) spread of contamination on a roadway as a result of burial cart failure; 2) work in the discharge area without badge and pencils; 3) contaminated process tubing in excess scrap; 4) temporary storage of reclaimed poison outside a radiation zone; 5) a high level speck of contamination found on the floor of a non-regulated pickup truck; and 6) a process tube nozzle giving a very high dose rate in a 30' tool room.

Lapse of Radiation Control
Distribution by Reactor and Operation

	<u>B</u>	<u>C</u>	<u>D</u>	<u>DR</u>	<u>F</u>	<u>H</u>	<u>KE</u>	<u>KW</u>	<u>IPD Totals</u>
Processing	2	0	1	1	0	2	0	0	
Maintenance	1	0	1	0	0	2	2	0	
Supple. Crews	0	0	0	0	0	0	0	0	
Research & Eng.	0	0	0	0	0	0	0	0	
Facilities Eng.	0	0	0	0	0	0	0	0	
Central Maint.	0	0	0	0	0	0	0	0	
Reactor Areas	0	0	0	0	1	0	0	0	
Assigned Totals	3	0	1	1	1	3	2	0	11
IPD General									0

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

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Effluent Water Statistics

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

Columbia River and Sanitary Waters

100-F Area

	<u>Raw</u>				<u>Sanitary</u>			
	Nov.	Dec.	Jan.	12 month average	Nov.	Dec.	Jan.	12 month average
%MPE _{GI}	6.3	8.8	7.7	6.1	1.4	2.0	2.7	1.4
% HAPO Limit					1.4	20	27	14

Pasco

	<u>Raw</u>				<u>Sanitary</u>			
	Nov.	Dec.	Jan.	12 month average	Nov.	Dec.	Jan.	12 month average
% MPE _{GI}	2.2	1.9	3.2	1.7	0.4	0.4	0.4	0.4
% HAPO Limit	44	38	64	34	8	8	8	8

Kennewick

	<u>Sanitary</u>			
	Nov.	Dec.	Jan.	12 month average
% MPE _{GI}		0.2	0.2	0.4
% HAPO Limit		4	4	8
				0.5
				10

Average Reactor Effluent Activity Output

	<u>February 1959</u>	<u>January 1959</u>	<u>February 1958</u>
107-B	27,000 μ c/sec	23,000 μ c/sec	24,000 μ c/sec
107-C	29,000 "	26,000 "	35,000 "
107-KW	58,000 "	40,000 "	30,000 "
107-KE	50,000 "	40,000 "	32,000 "
107-D	26,000 "	28,000 "	22,000 "
107-DR	18,000 "	21,000 "	14,000 "
107-H	26,000 "	28,000 "	26,000 "
107-F	30,000 "	36,000 "	15,000 "

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Radiation Control Standards and Procedures

Radiation Control Standard 1.4 concerning timekeeping was revised to make clear that a radiation monitor should only be restricted from timekeeping responsibility when he is performing monitoring.

Rough drafts were prepared of procedures relating to the following emergency conditions:

- 1) Blockage or rupture of effluent line, retention basin or outfall lines.
- 2) Criticality incident.
- 3) Emergencies resulting in uncontrolled spread of gross contamination.

Significant Reports Issued

"Corrosion Effects of Internal Chemical Decontamination - Turco 4306-B Through 105-B Reactor Process Tubes Containing Weighed Metal - Production Test Authorization IP-223-AE," HW-58496, dated December 22, 1958, authors H. F. Jensen, N. R. Miller, R. B. Hall.

"Supplement A to PT-207-A-3-FP Evaluation of Effluent Contamination Problems Associated with Nickel-Coated Fuel Elements," HW-58179-B, dated February 9, 1959, authors P. E. Hall and R. B. Hall.

"Final Report - Production Test IP-156-AI - The Effect of Water Quality On Effluent Activity," HW-59108, dated November 4, 1958, authors W. R. Conley and R. B. Hall.

"Protective Clothing Deficiencies Contributing to Skin and Personal Clothing Contamination," Undocumented, dated February 12, 1959, author L. A. Carter.

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PROCESS TECHNOLOGY OPERATION

REACTOR POWER LEVEL LIMITATIONS

Power levels at all reactors were raised above the ACRS power level limit. The limits to reactor power levels at the end of the report period were based on fuel element failure control at all reactors.

WATER TREATMENT

The bauxite feeders at 183-B operate approximately 85 per cent of the time.

The experimental sand-filter coal filter at 183-D is operating satisfactorily.

Continuous Filter Effluent Turbidity Monitoring

A recording microphotometer has been attached to filter No. 12, 183-B, to determine alum requirement trends. The system shows trends approximately 30 minutes after the raw water arrives at 183-B. With certain additions to the equipment the system could calculate alum requirements for any raw water within ten minutes after the raw water arrives at 183-B.

PROCESS STANDARDS

HW-46000 D, Process Standards - Reactor

Two Standards were revised during the month. These were:

Process Standard A-022 - "Tube Outlet Water Temperature Limits - TOA and Hole Corrosion"

Limits for enriched charges that are no longer used at C Reactor were removed, and I & E slug corrosion limits were added for B Reactor. IBM charge codes were included as an aid in rapid determination of tube contents.

Process Standard C-050 - "Process Tube Temperature Monitoring"

Restrictions governing start-up with inoperable thermocouples were relaxed for tubes containing non-fissionable charges.

Because tube temperature sensing elements are located on the rear crossheader, the indicated tube outlet temperature is slightly less than the true temperature when tube temperatures are above rear crossheader saturation temperature. The revised Standard provides curves which allow determination of the corrected tube outlet temperature. As a result, tube outlet temperatures are no longer limited to a maximum of 5°C below rear header saturation temperature, thus eliminating this restriction on reactor power level.

HW 46000 H, Process Standards - Reactor

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

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

Two separate revisions of this Standard were issued. The first revision, Section 70.01, permits use of a more rapid horizontal rod withdrawal rate on secondary cold start-up by allowing correction for xenon build-up. This makes earlier resumption of operating possible. The second revision, Section 70.02, no longer requires a fixed operating period before use of hot start-up rod withdrawal rates. Instead, use of these rates is determined by the reactivity status of the reactor at the time start-up is to be attempted. This provision should eliminate unnecessary use of restrictive start-up withdrawal rates, and result in more successful recoveries.

HW-27155 Rev1, Process Standards - Water Plant

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

183-A-020 - "Separan 2610, Hagan Coagulant Aid, or Activated Silica (Addition and Preparation)"

183-A-070 - "Chemical Additives"

183-A-090 - "Location of Chemical Addition Lines"

Provisions to permit routine use of Hagan coagulant filter aid in reactor cooling water treatment were added to the above Standards.

PROCESS CHANGE AUTHORIZATIONS

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

PCA #9-5 - "Ball 3X Component Testing - C Reactor"

The Standards require annual testing of the Ball 3X system by dropping the balls into the VSR channels. Because of deficiencies in the ball recovery system, the PCA permitted temporary use of a recently devised system for removing balls by vacuum recovery through the hopper fill pipe, in place of dropping the balls into the VSR channels. The PCA permits use of the vacuum method until completion of Project CG-741, "Renovation of Ball Recovery System." The vacuum method will reduce personnel exposure, compared to recovery with the deficient system, by approximately 20 mandays (1000 mr) per hopper. Conditions of use were specified.

PCA #9-6 - "Ball 3X Process Water Failure Trip Settings - F Reactor"

Because re-orificing and changing from solid to I & E slugs has reduced the hydraulic resistance of the reactor, it has been increasingly difficult to raise the cold water pressure high enough to ensure automatic re-setting of the LP trip for start-up. The PCA permitted reduction of the LP trip setting from 100 to 130 psi below cold operating pressure. This is believed to be the last of several changes necessary to keep pace with changing reactor resistance. Trip out test data indicates that the change in the trip setting will not significantly delay a ball drop if rapid water pressure decay occurred.

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PCA #9-7 - "Water Leak - B Reactor"

After start-up on January 20, the water collection rate at B Reactor remained high, although the reactor had just been leak tested and tube leaks repaired. Since evidence indicated a leak in a rear Van Stone flange, which should cause little graphite damage, the PCA permitted continued operation until manpower was available and outage time could be used efficiently.

PCA #9-8 - "Water Leak - DR Reactor"

On January 10, the water collection rate at DR Reactor increased above the value permitted by Standards, and all data indicated that the leak was in a rear Van Stone flange where it would not contribute significantly to graphite burnout. The PCA permitted continued operation for short period to allow scheduling of manpower and collection of dewpoint data which would assist in defining the leak location.

PCA #9-9 - "Reactor Water Screens - KE and KW Reactors"

During inspection raw water screens at KE and KW Reactors were found to have larger openings and a larger per cent open area than permitted by the Standards. The PCA permitted retaining present K Area screens on the basis of a recent evaluation which showed the screens to have sufficient strength and particle screening selectivity to comply with the intent of the Standard.

PROCESS ASSISTANCE

Auditing

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

Graphics

Graphics services prepared 44 graphs, charts, and visual aids for various IPD and HLO components.

RUPTURE EXPERIENCE

<u>Failure Date</u>	<u>Tube No.</u>	<u>Lot No.</u>	<u>Type Metal</u>	<u>Exposure</u>	<u>Type Failure</u>
2/4/59	4379KE	SK-036-D(1)	8" I & E Natural	653	Hole
2/16/59	0482H	KH-009-C	6" I & E E-Metal(2)	893	Side-Hot Spot
2/24/59	4280H	KH-013-C	6" I & E E-Metal(2)	801	Hole
2/28/59	2470KE	CK-072-D	8" I & E Natural	735	Side-Hot Spot
2/28/59	5148KE	SK-007-D(3)	8" I & E Natural	813	Hole

- (1) Reprocessed material, parent lot KK-052-D
(2) 0.94 per cent U-235
(3) Reprocessed material, parent lot CK-029-B

Legend:

Side Hot Spot - failure probably caused by accelerated corrosion in a localized region of high temperature.

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

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OPERATIONAL PHYSICS OPERATION

PILE PHYSICS ASSISTANCE

Two characteristics of February operation had strong operational physics implications; the first was removal of the ACRS limit and the second was the unusually long continuous operating period at each of the eight reactors.

Increased specific power and temperature limits renewed the importance of maintaining a stable and flat temperature distribution. Both the larger flattened zone due to increased enrichment and the more positive overall temperature coefficient associated with I & E loadings enhance any cycling tendencies, and decreased stability of flux distribution has been observed at the older reactors.

The longer operating periods have created the problem, new for the K Reactors, of compensating for long-term reactivity gains. With gas control not possible at either K Reactor this month due to helium saturation at the higher tube limits, the gains had to be compensated by letting the control rods move into the reactor. Both reactors experienced a reduction in flattening efficiency as the reactivity gains accumulated, and a unique timing of power cuts and raises was employed at KW to preclude uncontrolled cycling.

Experience in using the "cycle factor," an index for heat cycling tendencies based on graphite thermocouple reading swings, has not been consistent; this factor will, therefore, not be included in the following table of operating physics data. It was found that even in those cases where representative thermocouples were available, this method did not adequately distinguish between real cycling tendencies and insufficient attention to flux distribution control.

TABLE I

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

Pile	B	C	D	DR	F	H	KE	KW
ECT in Feb. (1)	1440	1650	1435	1480	1440	1595	2425	2450
12 Mo. Avg. ECT	1436	1600	1450	1490	1440	158 ^c	2405	2425
Equilibrium Scram								
Time (2)	25-28	25-30	18-20	27-40	30-35	15-20	17-22	18-25
No. of Scrams and	0/0	1/1	0/0	0/0	1/1	0/0	3/3	0/0
Recoveries (3)	0/0	0/0	3/2	1/1	0/0	0/0	0/0	0/0
No. of Non-Scram								
Outages (4)	1/0	3/1	1/0	0/0	0/0	0/0	1/1	0/0
Report Period, From	1/27	1/27	1/22	1/24	1/27	1/25	1/26	1/27
To	2/23	2/23	2/24	2/23	2/23	2/23	2/24	2/23

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

Footnotes continued on the following page.

Table I Footnotes (Continued)

- (2) This is defined as the maximum time available in minutes between scram and the first indication of start-up.
- (3) The first pair of numbers shows the number of brief outages from which secondary cold start-ups would be made and the number of successful start-ups. The second pair shows the number of brief outages from which hot start-ups 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 Pile - W. R. Smit

With removal of the ACRS limit the power level was increased to tube power limits. However, flux cycling (primarily front-to-rear) prevented further raises as graphite temperatures reached limits during peak periods in the cycles. Operation was continuous during the reporting period after the shutdown of 1-28.

C Pile - R. D. Carter

A power level increase of about five per cent was achieved following the ACRS limit removal. The reactor shut down for a water leak outage on 1-26. During the subsequent start-up the reactor was scrammed when an attempt to force turn-around by a power reduction failed; distortion resulting from the water leak reduced the flexibility of the control system. On February 2 the reactor was shut down for a scheduled outage.

Successful discharge of 50 tubes of 32-piece I & E uranium with no scrams by the OC-D equipment was successfully accomplished. Temperatures of tubes in various regions of the pile were monitored before, during, immediately after, and for 24 hours after a series of charge-discharge operations; the maximum variation noted was five degrees. Further studies are being carried out to assess the degree of operating conservatism which should be maintained because of these variations.

Two flux traverses were taken in tubes 1381 and 2182. 1381 showed nine per cent peaking about one foot downstream of the center line. Tube 2182 showed 17% peaking over the normal sinusoidal distribution about one foot downstream of the center line. This compares with a traverse taken on December 11, in 2083 of 18% peaking, four feet downstream, and October 15, in 2677 of 30% peaking, three feet downstream of the center line. There is no tube to compare directly with 1381.

Chattering of the solid aluminum charge in OC-D zone tubes resulted in the use of bismuth as a replacement.

D Pile - A. D. Vaughn

The power ascension program of raising only on day shift, which started with the removal of the ACRS limit, has caused some cycling problems; a more stable reactivity status would have resulted from a steadier continuous raise. Operation has been continuous since an extended outage on 2-1 which was initiated by a scram from a stuck spline

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D File (Continued)

Operation was hindered by failure to get splines in key locations early in the month because of a tendency for the spline tip to enter the central hole of the upstream tubular charge rather than under the charge. Temporary measures to force the spline under the charge have been successful and initial experience indicates that this sticking problem has been relieved.

Operation has been plagued by malfunctioning instrumentation. The triple PC chambers have been improperly positioned to give continuous information, and the fission chamber was inoperable during one start-up. The Flexowriter was consistently out of service during the first two weeks of February, automatically creating some control problems.

Heavy fringe discharging has had the effect of de-flattening the flux distribution, thus reducing the ECT.

DR File - D. I. Monnie

This is the first time in about a year that the reactor has operated near specific power limits at equilibrium. Previously, under the ACRS limit, the heat could be allowed to drift slightly without exceeding limits, but this is no longer the case. The tendency to allow the heat to drift has caused some front-to-rear cycling and has resulted in limits being exceeded. To improve operations an active program has been initiated to coordinate control philosophies and techniques between the shifts. Also changes have and will be made to increase knowledge and awareness of temperature drifting.

Operation has been continuous since 1-29 except for a Panellit scram caused by a faulty jumper on a PCCF tube on 2-2.

F File - R. A. Chitwood and R. L. Ferguson

Power raises following removal of the ACRS limit have been very cautious. As a result full advantage of the new limits has not yet been realized. The slow rise in power was necessary to minimize reactivity cycling. Operation has been continuous since the start-up of 1-28.

The zone temperature monitor, now in nearly full use at F Reactor, has proven to be a valuable operating aid in keeping the heat distribution balanced during non-equilibrium operation.

H File - G. R. Gallagher

No particular operating problems were encountered during the post-ACRS limit power ascension program. Operation was interrupted during the report period only by a rupture in an I & E² tube on 2-16.

The shutdown of 2-16 was unusual in that 58 per cent of the flux squared weighted exposure was discharged, dropping the residual from approximately 500 MWD/T to 200 MWD/T and lowering the hot reactivity by 330 inhours. Although it is too early in the operating period to be certain, a significant drop in ECT is expected to result.

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KE Pile - F. C. Franklin

The reactor achieved a record high ECT of 2517 early in the report period. However, long-term gains associated with the unusually long operating period resulted in a gradual distortion in the flux distribution which lowered the flattening efficiency. The reactor gas atmosphere consisted of 100 per cent helium thus requiring that reactivity gains be absorbed in the control rods. The normally expected graphite temperature cycling under these conditions has not been a serious problem primarily because the average metal exposure was fairly low.

Operation has been continuous since the start-up of 2-6.

KW Pile - C. E. Bowers

The highlight of KW operation during the month was the development of a severe cycle which was eventually damped by a relatively unique method developed by one of the reactor specialists and the pile physicist.

The problem arose when the pile atmosphere approached 100 per cent helium and long-term reactivity gains were steadily accumulating. Due to the nature of the equilibrium rod configuration, any increase in pile excess reactivity forced rod tips into the fringe zones, causing the central tubes to become more limiting. The second disturbing factor was a slight cycling tendency shown between front and rear graphite thermocouples, which was considerably aggravated by further penetration of control rods. Finally, when temperature limits were exceeded, efforts of rod manipulation appeared to make the cycle more severe, and an enforced power reduction was taken. It was apparent that further drastic power cuts would be necessary as the cycle seemed to be growing worse. Since the heat was cycling in and out of the center, the attempt was made to hold reactivity in rods constant by: (1) cutting power when heat was moving into the center (this would force rods out and effectively "open up" the fringes); and (2) raising power when temperatures turned and started moving toward fringes (this forced rod in and "invited" heat back toward the center). The gratifying result was a gradual damping of the cycle, until it was completely under control. This procedure, while simple, proved very effective in stopping both the fringe-to-center and the front-to-rear cycles with minor adjustments in control rods. Since this type of problem will probably become common at the K reactors, this technique of oscillating the power level may prove very effective in the future not only for stopping drastic cycles but also in controlling oscillating tendencies before they grow into full scale cycles.

Because of the long-term gains, even after the cycling was damped further power level decreases were necessary as the central region became relatively hotter.

A total of 19 splines were used for equilibrium and non-equilibrium flattening; 500 MWD (or more) production gain can be traced to this limited use of splines. As yet, spline operation has been very satisfactory, with little or no operating difficulty. An additional 25 spline caps, mainly within the flattened zone, were installed on the outage of 2-24, making a total of 46 available for use.

Operation was continuous from 1-29 to 2-24.

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PROCESS PHYSICS STUDIES

Reactor Control Studies

Trends in the disaster control requirement as a function of reactor operating parameters were calculated for the K piles and documented in HW-59115. The trends are displayed graphically, and a short qualitative explanation is given to assist in the interpretation of each effect described. Although the absolute magnitudes of the various reactivity effects are different in the older piles, the direction of total control trends and order of magnitude would be similar to the documented K case.

A background document presenting operational bases for the criteria and use of a "set-back" control system was published as HW-59239.

Additional calculations of total control requirement of NPR vs. possible fuel types were also made; the capacity and optimum geometry of the system is strongly affected inversely by the increased neutron age caused by streaming in the moderator voids.

The final report on the production test for studying the temperature cycling problem at the K piles was issued as HW-59007; it contains a detailed qualitative description of cycling causes and of Hanford experience in observing and overcoming this problem.

Operational Reactivity Studies

The fundamental calculations for determining base reactivity status have been extended and continue to indicate that past "losses" result from inadequate reactivity weighting procedures. Work in this field will take on two aspects: Familiarizing the pile physicists with the more fundamental calculational methods required, and devising approximate weighting methods acceptable for routine use.

An abstract has been submitted for an unclassified paper on improvements in Hanford conversion calculation techniques and procedures to be presented at an AEC accountability meeting later this spring.

Preliminary planning and contacts have been made for initiating a program of graphite coefficient measurements by establishing effective minimum down-time from sub-critical measurements during reactor outages.

Pu-240 Program

The depleted uranium from this program is currently being held identified by columns in the C storage basin. They are to be sorted into exposure ranges as soon as official notification is received and experimental analyses of Pu and Pu-240 content have been obtained and satisfactorily correlated.

Supplementary Control

D pile spline start-up problems were averted during the early February outage, with close inspection and assistance by Mechanical Development employed. This

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Supplementary Control (Continued)

outage resulted from a scram apparently due to spline obstruction of the central hole of the upstream I & E slug. This problem plagued several attempts at spline insertion for flattening during the early part of the month, but the problem was later relieved by bending the tip slightly downward to force it beneath the upstream dummies. Spline cap attachments, as used at KW and now being fabricated for D pile, should preclude this problem in the future. An economic analysis of D pile spline performance to date continues to show good incentives for perfection of this system to permit replacement of the PCCF.

The third and fourth spline start-ups at the KW pile permitted improved start-up efficiency with reasonably good mechanical performance.

The estimated installation time for the six-column poison column displacement prototype has moved back to mid-1959. No additional prototype will be built on-plant because of the slow fabrication time available.

Pile Efficiencies and Potential Gains

These data for January are reported in HW-58925. The January production efficiency at B was low because of an extended outage for tube replacement, and that at C was low because of two D-metal ruptures and final discharge of that program.

Reactor Fundamentals Training

The entire force of reactor specialists has completed the first two chapters of the Reactor Physics Primer through the fundamentals of the reactor process. The three-month series just started includes the 32 operating specialists on shifts and covers the classified Chapter III, "Pile Structure and Instrumentation."

Additional fundamentals classes in the Personnel Development schedule were provided during the month for IPD engineering personnel. Contacts made by the instructors in these classes with other engineering personnel have been mutually beneficial.

Shielding Studies

Determinations were made of the neutron and gamma attenuation and the heat generation rates through the NPR shield by means of the IBM 650 program previously developed by W. L. Bunch. Additional calculations to be coordinated with FEO and PARDO studies include axial computations, empirical adjustments of fast flux attenuation through the reflector, and refinements in heat generation calculations in the reflector.

Documents of Operational Physics Interest Issued During January and February

"Physics and Engineering Variables Affecting Reactor Production, January through March, 1959": HW-58700, KW Reactor, C. E. Bowers et al, 12-31-58; HW-58658, C Reactor, R. D. Carter et al, 12-12-58; HW-58752, H Reactor, G. R. Gallagher et al, 1-6-59; HW-58627, B Reactor, W. R. Smit et al, 12-23-58; HW-58630, DR Reactor, D. I. Monnie et al, 12-23-58; HW-58646, F Reactor, R. A. Chitwood et al,

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Documents Issued (Continued)

12-12-58; HW-58653, D Reactor, A. D. Vaughn et al, 12-26-58; HW-58652, KE Reactor, F. C. Franklin et al, 12-26-58.

HW-58707 - "Reactivity Balance and Associated Reactor Physics Data, December 1958," D. E. Goins, 1-6-59.

HW-58925 - "Potential Gains and Operating Efficiencies, December, 1958," W. S. Nechodom and D. E. Clark, 1-9-59.

Section 5200, "Neutron Instrumentation," HW-46100 Vol. 2, "Pile Physics Manual," G. R. Gallagher, 1-16-59.

HW-59056 - "Physics Effects of Water Mixing Pieces," G. R. Parkos, 2-3-59.

HW-59115 - "Total Control vs Reactivity Parameters," D. E. Simpson, 2-5-59.

HW-59086 - "Reactivity Balance and Associated Reactor Physics Data, January, 1959," D. E. Goins, 2-6-59.

HW-59239 - "Operational Bases for a Control Rod 'Set-Back' System" D. E. Simpson, 2-12-59.

HW-59195 - "Potential Gains and Operating Efficiencies, January, 1959," D. E. Clark and W. S. Nechodom, February 7, 1959.

HW-59007 - "Final Report on PT-105-630-A 'Pile Power Distribution Control at the K Piles'" R. O. Brugge, 2-18-59.

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IRRADIATION TESTING OPERATION

KAPL-120 LOOP

The empty in-pile tube was on process water cooling during this period.

The heat exchanger installation and its associated piping and instrumentation is estimated to be 80 per cent complete. The flow tube instrumentation piping is complete except for lagging. The instrument panel installation is under way. All connections from the added or modified equipment to the main loop have been completed and the out-of-pile part of the loop has been pressure tested at 2700psi. There were no leaks except for one leak at the flange on #2 pump. This will require back-welding. Several sets of orifices for each of the flow tubes have been designed, fabricated and calibrated.

An irradiation was made in the Hanford Test Pile to determine the increase in heat generation in an NRM plate when the PWR plate immediately above is removed. The increase was found to be 20 per cent $\pm$ 10 per cent. A second irradiation is in progress to improve the statistical accuracy and to determine if the increase is sensitive to plate enrichment. These data are needed by WAPD to help them decide upon the best arrangement of fuel plates.

DR GAS-COOLED LOOP

The construction activity on the DR Gas-cooled Loop was resumed on February 9. Three compressors were shipped from General Engineering Laboratory on February 18 and one is expected to arrive on-plant early in March. The project completion date remains at June 30, 1959.

Five representatives from General Atomics, a Division of the General Dynamics Corporation, one representative from the Maritime Reactors Branch, AEC, and one representative of the San Francisco Operations Office, AEC, visited Hanford on February 5 and 6 to discuss the first fuel element to be tested for the Maritime Reactors Branch. Preliminary studies indicate that the proposed element is compatible with the loop operating characteristics. The target date for charging the first test was tentatively set for August 1, 1959.

Physics data needed by General Atomics personnel for designing the first fuel element for the DR Gas Loop were assembled and forwarded to them in document HW-59249, "Reactor Data For Gas Loop Calculations", dated February 12, 1959 by W. L. Bunch.

Work continues on generalizing the pressure drop and temperature distribution calculations for the helium cooled loop. The generalized relations will aid in making detailed and direct evaluation of test proposals.

HAPU FUEL ELEMENT IRRADIATIONS

The responsibility for the routine monitoring of the temperature profile in the I & E cooling annulus (HAPU-159) is being transferred to the Central Maintenance Operation and the reactor areas as rapidly as possible.

Four enriched 7-rod cluster fuel elements were discharged from test hole 3674-KE (HAPU-195) on February 4 after reaching 100 per cent of goal exposure.

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The irradiation of one three-foot-long swaged UO_2 fuel element in test hole 3865-KE (HAPO-215) continues. As of February 18 the fuel element had reached 28 per cent of goal exposure. A production test is being routed for approval which authorizes relaxation of the panellit trip settings. This will relieve the possibility of a reactor scram due to pressure fluctuations which have been noted during start-up.

OTHER IRRADIATION TESTS AND SERVICES

1. A total of fifteen sets of activation analysis samples were irradiated in the Poison Column Control facilities at D and DR piles. These samples are identified as follows:
 - a. Ten sets of HAPO-184 samples in support of a Washington Designated Program assigned to HLO.
 - b. Five sets of natural uranium samples (HAPO-218) in support of an investigation of the release of fission products from uranium at high temperatures in oxidizing atmospheres. The fission release investigation is being conducted by HLO.
2. A total of fifteen samples were irradiated or are undergoing irradiation in the Quickie facility (E test hole) in F pile. These samples are identified as follows:
 - a. Five yttrium oxide pellets (U of W 104) to provide high energy beta sources for treatment by radiation-surgery of certain types of cancer. These sources were prepared for use by the University of Washington's Department of Surgery.
 - b. One sample of effluent water residue (HAPO-172) in support of an HLO study of the radioisotopes in effluent water.
 - c. Four samples of pure aluminum (HAPO-223) furnished by vendors as candidate materials for Pneumatic Facility rabbits. These samples were irradiated to determine if any long half-life radioactive impurities are present in the material.
 - d. Two samples of UO_3 (HAPO-227) to provide a Np^{239} tracer in support of an HLO chemical separations study.
 - e. Three samples of UO_2 (HAPO-229) in support of an HLO study of the effect of neutron irradiation and fission events on the structure of thin foils of UO_2 . The examination is being done with an electron microscope.
3. One graphite casing (HAPO-119) was charged and one casing discharged from the Magazine facility (2 B test hole) at KE reactor. These irradiations are in support of an HLO study of irradiation damage to graphite.
4. Thirty-four baskets began exposure and thirty-three baskets completed exposure in the KE gamma facilities. The bulk of these irradiations are sponsored by the Non-Metallic Materials Development Operation, HLO.

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5. A life test of a PRTR shim rod control motor is under way. The motor will be operated in an inert gas atmosphere while being exposed to a high gamma field in one of the KE gamma facilities.
6. The irradiation of two thermocouple leads, one with asbestos insulation, the other with quartz insulation was discharged from the 4B test hole at KW reactor on February 24. (HAPO-199).
7. The irradiation of a thermocouple capsule to determine to what extent the electrical output of thermocouples is affected by the gaseous atmosphere which surrounds the thermocouple bead (HAPO-199) continues in the 2A test hole at KW reactor.

TEST FACILITIES

1. Borescopic examination of the Snout Facility (4B test hole) at KW reactor revealed chatter marks on the top of the inner tube at about 18 feet in from the pile skin. These chatter marks are believed to be caused by the solid aluminum spacer charge chattering during periods when increased water flow in the bore was required to satisfy test conditions. This facility will be removed when a new Snout facility is ready for installation.

A new Snout facility was designed and is being fabricated which requires no spacer charge; this will eliminate the hazard of chattering. The new facility also has a smaller in-pile volume of water which will cost less in reactivity.

2. The 36" Shield Plug facility was opened to install an NPR boron-steel thermal shield experiment. The front section of the nose plug was covered with a black porous material which adhered to steel components and ran into all available cracks and crevices. About twice the normal force was required to remove the plug from the pile. This material is believed to be masonite which "boiled" out of the one remaining iron-masonite insert. Installation of the scheduled experiment was postponed. Most of the material was removed from the nose plug but a substantial amount of material remains in the in-pile gas seal liner. Plans are complete for removing the balance of the material during the next reactor outage.
3. Piping and interlock changes to renovate the Pneumatic facility discharge pipe to the hot cell are proceeding satisfactorily. The facility and hot cell should be ready for performance during the KE extended outage. The hot cell is estimated to be 80 per cent complete.
4. Progress on the hot graphite facility to be installed in the 2C test hole KE reactor is proceeding satisfactorily. The new step plug and spacer boats will be installed during the next KE shutdown. Work on the discharge cask has started in the Central Shops. The first sample bearing boats will be charged during the KE extended outage.
5. The new step plugs for the Z2, Z3 and Z4 traverse holes at KE and KW reactors are 90 per cent completed. The step plugs will be installed during the latter part of March. These step plugs are being provided to facilitate obtaining routine vertical height traverse data at the Z hole locations.

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BORESCOPING ASSISTANCE

Three problem channels were borescoped at C reactor during the rehabilitation effort performed by the Maintenance Operation.

VERTICAL BOWING MEASUREMENTS

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

<u>Area</u>	<u>Tube</u>	<u>Date</u>	<u>To a Depth of</u>	<u>Results</u>
105-DR	2362	1-29-59	40 feet	No previous data.

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COOLANT TESTING OPERATION

During February 1959, activities of the Coolant Testing Operation included operation of the 1706-KE in-pile and out-of-pile equipment, operation of the 1706-KER in-pile loops, and operation of the 1706-KER Rupture Experiment.

A summary record of operation of each piece of equipment follows, including significant items of performance and improvements.

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

The six central zone single pass tubes that were charged on January 14, 1959 with I & E fuel elements canned in X-8001 aluminum alloy, including a mixing slug continued operation under the same operating conditions reported last month, namely:

4355	7.0 pH filtered water and 2 ppm dichromate
4456	7.0 pH filtered water and 1 ppm dichromate
4557	7.0 pH process water
4863	7.0 pH process water
4963 & 5063	6.5 pH process water

Tube 2943 continued to be operated with weighed numbered dummies for corrosion tests on 1245 aluminum in preheated water at 90°C.

Mock-Up Tubes

The mock-up tubes were started up on February 4, 1959, after an extended shutdown for revision. The following tests are now in progress:

Tube #5 - Corrosion evaluation of two types of nickle plated slugs, electroplate and chemical plate and corrosion evaluation of four types of X-3001 aluminum cans. The test conditions are process water, 50 gpm at 120°C.

Tube #7 - Galvanic corrosion evaluation of two types of nickle plated slugs, electroplate and chemical plate. The test conditions are process water, 40 gpm at 60°C.

Tube #11 - This test is to evaluate four different types of coupon holders for in-pile use. The test conditions are process water, 35 gpm at 130°C.

ELMO LOOPS

ELMO-1 - The loop was shutdown during the month.

ELMO-2 - The loop was shutdown during the month.

ELMO-5 - The loop was operated during the month at 290°C and pH 10.0. The loop was shutdown on February 6, 1959, and February 19, 1959 for scheduled discharge of test coupons of carbon steel, Zircaloy-2, stainless steel, Hasteloy-C, monel, nickel, and stellite. Examination of stressed 304 stainless steel coupons previously exposed to the Turco 4501 decontamination process indicate no stress cracking or crevice corrosion.

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ELMO-6 - The loop was shutdown on February 4, 1959, for scheduled discharge. Samples of X-8001 aluminum and 304 stainless steel were removed. The autoclave section was charged with samples for filming studies. The loop was again shut-down on February 16, 1959 for discharge of all regular samples.

Samples of Zircaloy-2, welded Zircaloy-2, and filmed 304 stainless steel were inserted in the revised insert placed in the regular test section. Coupons of aluminum were sandwiched between the Zircaloy-2 coupons. A Turco 4501 decontamination process was then performed. The purpose of the test was to see the effects of the Turco 4501 process on loop components and the effect of hydrogen on Zircaloy-2. (Hydrogen is released from the aluminum coupons and chemicals used in the Turco process)

The test coupons are now being examined. Examination of the loop revealed severe attack on the bellows of the Bailey differential pressure transmitters. The loop will remain shut down until new bellows are obtained.

ELMO-7 - The loop remained shut down during the month, until February 26, 1959, while heater repairs were made. Thermal cycling of the revised NPR flared nozzle-to-tube connection is now being continued. The revised Marmon-Conaseal NPR cap failed after one cycle. A new test was started to determine the corrosion rate of nickel plated aluminum slugs.

ELMO-8 - ELMO-8 will be installed by the Contractor (CG-671) about April, 1959.

ELMO-10 - This loop remained shut down during the month awaiting arrival of a new pump.

Dowtherm Unit - The unit was shut down after the failure of the drive motor on the main pump. A replacement motor has been received but the unit will remain down because of a power shortage. (Transformer at 165-KE burned out)

CEP-1 (Corrosion Experiment Prototype)

This loop has been shut down during the month awaiting parts. Parts were cannibalized from this loop to use on the KER Rupture Experiment.

Organic Coolant Program

ORA-1 - The loop was operated with MJPB at 700° F. during February. The test was to determine the corrosion effects of maintaining 20 ppm of water in the system. The test coupons are magnesium-beryllium alloy, zirconium, and carbon steel. During the month the coupons were discharged and similar coupons recharged. The test conditions remain the same except the water content was raised to 45-50 ppm.

ORA-3 - The loop has been shut down during the month. The next test will be to check leakage of MJPB with American standard dryseal threads.

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KER Rupture Experiment

One complete run has been finished successfully. Radiation levels from 200 to 8000 milliroentgen per hour were reduced to from zero to 20 milliroentgen per hour. The equipment is being readied for the next run which will start the first week of March.

The initial charge was 28 grams of uranium which had been irradiated to 600 MWD/Ton and aged 2-1/2 months after discharge. It was completely disintegrated after being contacted with water at pH 10.5 and at 250 to 290°C. for three hours. Loop activities rose rather consistently during this entire period. Flow during this contamination run was 24 gpm, liquid velocity was 16 fps through the one-inch loop piping.

After contamination the entire loop was cleaned by water flushing, and by the Turco 4512 process. The carbon steel test section was then isolated and the stainless steel loop cleaned with the APACE and 4501 processes. In order to clean the cask and to further reduce radiation levels, the 4501 process was repeated through the entire loop, cask, and test sections. The decontamination data are:

<u>Process</u>	<u>Radiation Level, MR/Hour @ 6"</u>					
	<u>Carbon Steel</u>			<u>Stainless Steel</u>		
	<u>Typical</u>	<u>Maximum</u>	<u>Minimum</u>	<u>Typical</u>	<u>Max.</u>	<u>Min.</u>
After Contamination	500	1700	260	100	5000	500
After 4512 Process	50	600/70 ⁽¹⁾	40	500	3000	200
After APACE Process	-	-	-	50	1000	5
After 4501 Process	-	-	-	25	150	Nil
After 4501 Process	5	13	2	15	20	Nil

(1) 600 Mr/Hr. before coupon discharge; 70 after.

Induction Heating Apparatus

The induction heating apparatus is now undergoing minor repairs before final testing.

KER Facility

Loop 1 - The loop has been operated at low temperature during the month because of a flow reduction caused by increased pressure drop in the reactor portion of the loop. A plugging of the holes in the collector ring in the outlet nozzle is suspected. Leaks on the bonnet gasket of the heat exchanger 3-way valve and the degasifying orifice flanges have developed. The present charge consists of Zircaloy-2 clad 1.6% enriched 7-rod clusters, a seven element thermocouple train and coupon holders.

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Loop 2 - The loop continued operation under the same conditions as last month at 205°C. and pH 10.0. The present charge consists of one 38-inch Zircaloy-2 clad enriched cluster element, two 18-inch Zircaloy-2 clad wire wrapped 7-rod UO₂ elements, and four 13-inch 7-rod Zircaloy-2 clad enriched cluster elements with triangular end supports.

Loop 3 - The loop was discharged on February 4, 1959 and re-charged with 25 X-8001 aluminum jacketed depleted uranium elements, with removable spiders as end supports. The charge also contains one X-8001 aluminum jacketed Doe alloy thermocouple element, a capsule containing zircaloy samples, and three coupon holders in the downstream end containing aluminum and zircaloy samples. The pH was changed from 6 to 4.5. The P.T. authorizes a temperature of 245°C but because of low tube power the attainable temperature is 230°C.

Loop 4 - The loop continued operation during the month at 220°C and pH 4.5. The present charge consists of two rod-and-tube elements on one 18-inch 7-rod Zircaloy-2 clad UO₂ cluster element.

1706 KE-KER Performance and Improvements

A total of 4.4 hours of KE reactor outage time was charged to the Coolant Testing Operation during the month. This time was used to discharge-charge Loop 3. (IP-229-A)

Improved KER In-Reactor Tubes

Of the four tubes received, one has checked out good. A second tube has a small defect, but it is being removed and it now appears minimum wall thickness will remain and the tube will be good for 300°C.

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COMPONENT TESTING OPERATION

IRRADIATED MATERIAL EXAMINATION

Examinations of the fuel elements from the following seventeen tubes were completed at the Metal Examination Facility during February.

<u>PT No.</u>	<u>Tube No.</u>	<u>PT No.</u>	<u>Tube No.</u>
56A	2157-C	Stuck Chgs.	1583-H
	2158-C		2789-H
	2167-C		3671-H
	2183-C		3658-DR
	2270-C		2162-DR
	3763-C		2362-DR
178A	2275-KW	I&E	1155-KW
I&E M-388	2762-D		2089-KW
	3761-D		

PROCESS TUBE CORROSION MONITORING PROGRAM

In-pile measurements of 135 process tubes were made during the month. Listed below are the number of tubes measured per reactor and document numbers of the reports issued.

<u>File</u>	<u>No. of Tubes Probologged</u>	<u>Report No.</u>	<u>HW Number</u>
B	43	6	59111
D	47	7	59132
C	13	8	59184
H	28	9	59278

The results of the four tubes from KE were reported in a letter to R. E. Hall, dated February 24, 1959.

Visual and metallurgical examinations were completed on tubes 1868-C and 4769-KE. In leaker tube 1868-C four holes were found. This tube had been partially charged with solid aluminum slugs. It was found that the holes were the result of chattering of the 2nd, 3rd, 4th and 5th dummies which were located upstream from the rear gunbarrel. No severe damage was found in tube 4769-KE. Several polished areas were evident which indicated that some of the perfs had possibly chattered.

EXAMINATION OF FRONT FLEXIBLE CONNECTORS

Eight front tube connectors were examined from KW. Of the eight connectors received, only three (0681, 0653 and 5377) were labeled showing what tube they were removed from. The examination revealed all eight connectors were in good condition. No broken wires, wearing on the braids, or teflon liner damage was observed.

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PANELLIT PROGRAMS

During February, 602 gauges were process inspected in the individual area Instrument Shops. Of this number, 131 were rejected due to nonconformance to Standards, for a percentage rejection of 21.7, a reduction of 3% from last month.

In-Board Reliability Examinations were performed on 323 Panellit gauges in 100-H, D, KE and KW Areas. Seventy of this total were found to be substandard and were removed from service. This is a percentage of 21.7, an increase of 1.2% over the month of January.

No Bourdon tube leak examinations were performed this month due to unusually long operating periods of all reactors. To date, 69,620 Bourdon tubes have been examined in-board and 250 have been detected as leaking for an overall leak rate of .35%. Curves monitoring leak rates for all reactors indicate a slight increase in leak rate.

Failure Analysis procedures were applied to only 13 gauges during the month. This is a new low compared to the former low of 18 for a one month operating period. The Panellit Gauge Failure Analysis report for the two month period ending February 1, 1959, was published by document HW-59068.

Procurement Specification No. HWS-6744 for purchase of DT-100-T Panellit gauge mercury switches was published during the month.

Panellit gauge in-board response-time checks, using equipment perfected during the month, were performed on 225 gauges in H, D, KE and KW Areas. The results were generally favorable.

Bids from Panellit Inc., Skokie, Illinois, covering purchase of "2-B" contact type switches were received and approved during the month. Successful procurement of this switch will permit installation of a Panellit scram system which will initiate a scram due to pressure increase or decrease only.

A program authorizing the inspection of critical Panellit gauge spare parts by Component Testing Operation personnel - prior to making parts available for store order purchase - was documented during the month. This program was formulated with the active participation of both the Standard Engineering Operation and the Spare Parts Records Operation personnel.

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INVENTIONS

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

Inventor (s)

Title

None

Manager, Research and Engineering
IRRADIATION PROCESSING DEPARTMENT

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B-C REACTOR OPERATION
FEBRUARY, 1959

I. ORGANIZATION AND FUNCTIONS - The position of Specialist, Safety and Fire Prevention (and the incumbent, L.H. Rice) was transferred to B-C Reactor Operation (General) from IPD Employee Relations Operation, effective February 1; position responsibilities include the administration of Safety and Fire Prevention activities for B-C and KE-KW Reactor Operations.

II. PERSONNEL

A. Force Summary

	<u>January 31</u>			<u>February 28</u>			<u>Net Change of Total</u>
	<u>E</u>	<u>NE</u>	<u>Total</u>	<u>E</u>	<u>NE</u>	<u>Total</u>	
General	3	3	6	4	3	7	+1
B Processing Operation	16	39	55	16	39	55	0
C Processing Operation	16	33	49	16	34	50	+1
Power Operation	15	96	111	15	96	111	0
Maintenance Operation	22	103	125	22	104	126	+1
TOTAL	72	274	346	73	276	349	+3

B. Movement of People - Exempt changes included the transfer in of J.W. Baker as Manager, B Processing Operation and L.H. Rice as Specialist, Safety and Fire Prevention, and the transfer out of R.G. Clough, Manager, B Processing Operation, to F Reactor Operation; nonexempt changes included 9 transfers in, 6 transfers out and 1 termination (retirement).

III. PERSONNEL ACTIVITIES - Mr. K. Gahley of the U.S. Department of Labor visited 100-B Area on February 12 to discuss the Lunch Period Relief Practices case with B-C Power Operation employees. G.O. Amy, Supervisor, B-C Maintenance Engineering Operation, visited the Continental Wire Corporation's plant at Wallingford, Connecticut on February 16 to help resolve the vendor's problems in fabricating thermocouple wire to specifications (HWS-6355).

IV. SAFETY AND SECURITY - There were 19 medical treatment injuries and one security violation (open file cabinet February 6); there were no disabling injuries or serious accidents. A Practice Evacuation was conducted at 10:30 AM February 12.

V. NON-ROUTINE REPORTS - None

VI. INVENTIONS AND DISCOVERIES - All persons engaged in work that might reasonably be expected to result in inventions and discoveries advised that, to the best of their knowledge and belief, no inventions or discoveries were made in the course of their work during 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.

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VII. COMPONENT ACTIVITIES

GENERAL

- A. Administrative Activities - Consolidated forecasts of B-C Operation's FY1960 and FY1961 budget requirements (Operating Expenses and Equipment Not Included in Construction Projects) were submitted to the General Accounting Operation. A review of Exempt Salary and Appraisal plans was conducted, continuing over month-end. A new Position Guide for Specialist, Safety and Fire Prevention was approved and a new Position Guide for Analyst, Reactor Testing (C Processing) was submitted for approval. The program was continued (with some alterations) for writing Job Descriptions on all nonexempt, nonbargaining unit jobs. Personnel planning for N Plant was started. Increased responsibilities and duties were assumed for the administration of deferred vacations, training activities, nonexempt Progress Reports and Evacuation Procedures.
- B. Personnel Development - Eleven exempt and two nonexempt employees attended 7 IPD Training Program classes. 97 nonexempt employees participated in In-Plant Training activities. 7 employees started participation in the 5th series of PBM-I classes. 1 Technical Graduate continued a 3-month Rotational Program assignment with C Processing Operation and another was assigned, to B Processing Operation.
- C. Cost Control Activities - Representatives of B-C's operating and maintenance components met to review planned maintenance costs for FY1959-to-date and to reaffirm or revise schedules and cost estimates for work to be done in the remainder of FY1959; also, the consolidated forecast of planned maintenance requirements for FY1960-1961 was reviewed and revised.
- D. Landlord Activities - Considerable planning was done, and work orders were issued, for painting, floor resurfacing and other landlord maintenance to be done in March. A work order was placed for repair of the 190-B tank room roof (slabs had blown off). Further roof leak repair will be done as a continuation of the major roof repair project.
- E. Suggestions - Under study at the start of the month: 40, received for study during the month: 32, completed during the month: 34, under study at the end of the month: 38. Two Suggestion Seminars were held for B-C Management and evaluators.

B PROCESSING OPERATION

- A. Production - Input production was 121 percent of forecast and was limited by tube power considerations. The TOE was 87.7 percent. New record power levels were attained due to planned increases in tube powers.

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- B. Operating Experience - There were two unscheduled outages, one continuing from January.

<u>Day</u>	<u>Outage Hours</u>	<u>Cause</u>
1	17.9	Continuation of unscheduled outage for water leak.
26	64.6	Broken nozzle, Tube 3675 front.

The reactor was manually scrammed at 7:26 AM, February 26, 1959, when the front nozzle of a PCCF tube was broken off; the C Elevator had been moved before the charging machine had been disconnected. As a result, irradiated dummies and poison pieces were flushed onto the charge elevator. There was no appreciable exposure to personnel involved. Outage time was utilized to dispose of irradiated material, charge-discharge, and maintenance work.

- C. Equipment Experience - Complete loss of B Reactor's normal power supply (about 2/3 of the connected load) occurred on an outside line failure on February 9; power was off for approximately six hours, but no production loss was incurred. Graphite thermocouples continued to fail at a high rate; procurement of improved type stringers is in progress.
- D. Improvement Experience - PT-IP-84A, "Evaluation of slugs having projections for use in ribless tubes" - two tubes were discharged for inspection. PT-IP-223AE, "Through Pile Turco Decontamination, Individual Tubes" Phase I of this program was completed (10 tubes) during the February 26 outage.

Work continued on the following projects: Project CG-780, "Improvement to 105-B Ventilation System", "Project CG-706, "Installation of Improved Reactor Gas Instrumentation", and Project CG-707, "Improvements to Reactor Nuclear Instrumentation, All Reactors".

- E. Radiation Monitoring Experience - Two employees were exposed to unknown dose rates when a ball valve was broken off the front of PCCF Tube 3675, allowing water and dummies to flush onto the C Elevator; maximum personnel dose was later established at 40 mr; the occurrence was investigated and reported in document HW-59457 (March 3, 1959). The dump lever on the burial cart tripped and spilled contaminated water on a 200-foot stretch of roadway within the exclusion area following dumping of perfs in the storage pits. Maximum contamination on road was 35 mrad/hr, including 5 mr/hr. Area was decontaminated.

Maximum personnel dose rates observed for various work were as follows: Miscellaneous work in rear face associated with discharge operations - 150 mr/hr; Reactor leak testing in rear face - 120 mr/hr; Condensate draining in the 115 Building dryer rooms, 800 mr/hr; Repair of Darling valves in the dryer rooms, 1 r/hr; Inspection of the 115 tunnel - 1 r/hr; Poison decontamination - 100 mr/hr; Picking up of dummies and poison on the C Elevator and placing in water-filled cans, from the top of the reactor - 600 mr/hr; Removing the dummy-filled cans from the C Elevator to the 0-foot far entrance - 1 r/hr; Place cans on truck - 500 mr/hr.

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Neutron surveys of the reactor at the new higher operating level disclosed: 25 mrem/hr on the front face; 4 mrem/hr on -9 foot far side; 20 mrem/hr on X level, with an unexplained dose of 50 mrem/hr at the side of D Hole. This is being investigated further. A total of 21 air samples were taken during the month; none indicated activity densities greater than the permissible limits for respiratory protection work. Of the 40 vehicles surveyed, none were found contaminated. Reactor atmosphere gas leaks continue to restrict movement in the work area with activity levels of 40 mrad/hr, due to radioactive gas, present at the work area near entrance for extended periods.

- F. Events Influencing Costs - Overtime Usage: A total of 8 nonexempt, and 8 exempt manhours were utilized. One helium startup was made. The total helium used was 214,600 cubic feet, as compared to 220,301 cubic feet in January. The total gas used was 351,828 cubic feet, as compared to 323,029 cubic feet in January.

C PROCESSING OPERATION

- A. Production - Input production was 101.8 percent of forecast. Power level was limited by a tube power limit. A new maximum operating level record was achieved. TOE was 75.5%.
- B. Operating Experience - Two outages (one scheduled and one unscheduled) were experienced as follows:

<u>Day</u>	<u>Outage Hours</u>	<u>Cause</u>
2	107.9	Scheduled outage - replace problem tubes and install straight rear connectors.
20	56.8	Unscheduled outage - excessive water collection
	164.7	

- C. Equipment Experience - The reactor was shut down on February 20 to investigate a water leak. A rear leak was found on Tube 1665 (bad gasket) and on ball valve Tube 2169. The leak on 2169 occurred as a combined result of a too-narrow vanstone flange and failure of the ball valve adapter to seat properly against the vanstone gasket. A new vanstone flange was rolled on the tube and a new adapter installed to correct the leak. During the operating period prior to the shutdown, 1010 gallons of water were collected from dryer regeneration and the drip leg.

Sections of old tubing were removed from problem Channels 0572 and 2566. These channels were retubed along with Channels 1075, 1165, 2472, 2482, and 3573. Problem tube Channel 2488 was also cleared of a remaining obstruction (12 inch section of tubing), but was left as an air channel due to maintenance manpower exposure considerations.

Repairs were made to 60 faulty thermocouples during the month. Disassembly of the vacuum producer was necessitated as a result of operational failure. Inspection revealed that many of the impeller blades were badly worn. Replacement of the worn blades was in progress at month's end.

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- D. Improvement Experience - PT-IP-162-E - "Routine Uranium Charging During Reactor Operation" - Tubes in the ball valve pattern were processed 62 times during operation without affecting the reactor continuity. The 62 charging operations included 51 uranium metal charges, 8 B-metal charges and 3 solid aluminum charges. Other activities during the month consisted of running functional trip checks, interlock checks, and correction of circuit defects in preparation for full pile acceptance tests.

PT-IP-207-A - "The Evaluation of Effluent Contamination Problems Associated with Nickel Coated Fuel Elements" - Six tubes were charged to initiate this test. Two of the tubes were charged with fuel elements coated with electro-plated nickel, two tubes with chemical plated nickel coated slugs, and two tubes with untreated aluminum jacketed slugs for control purposes.

At month end, the following number of Production Test Tubes were in C Reactor: 2 tubes of IP-39-A, 12 of IP-93-A, 25 of IP-130-AE, 8 of IP-132-AC (D metal), 31 of IP-132-AC (E metal), 3 of IP-143-A, 3 of IP-168-A, 16 of IP-179-A, 6 of IP-207-A, 30 of 210-A, and 1 of 105-575-SR, total: 137.

CG-741 - "Renovation of the Ball 3X System 105-C" - The following equipment was installed: a new bucket elevator and chain assembly piping for the ball washer, new ball storage hopper and ball washer and drier. Installation of the service lines to the ball washer and dryer and installation of the hot ball separator were in progress at month's end.

CG-666 - "Zone Temperature Monitoring" - Electrical leads were run from the control room terminals to the D elevator machinery room in preparation for tie-in with the rear face terminals.

Rear Face Connectors - The installation of straight type rear face connectors and silicone o-rings was completed on all tubes on rear cross-headers 40 through 43. In addition, 44 were installed on the reactor to facilitate thermocouple repairs. To date, 326 have been installed.

- E. Radiation Monitoring Experience - There were several cases of effluent vapor contamination during work in the rear downcomer room, and a number of construction personnel received skin contamination during the ball 3X modification project.

External Exposure Experience

<u>Location</u>	<u>Type of Work</u>	<u>Personnel Dose Rates</u>	
		<u>MAX. mrem/hr</u>	<u>AVG.</u>
Discharge Area	Pushing down chutes	1000	150
Winch Level	Removing ball 3X elevator piping	1500	75
Inner Rod Room	Replacing ball 3X elevator chain	150	20
Charge Face	Vacuuming a tube channel	800	15

As a result of increased operating levels, the dose rate in the work area corridor has increased to 12 mrem/hr.

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Nineteen vehicles were surveyed and none were found contaminated. There were four instances of personal clothing contamination; all items were decontaminated and released with the exception of one pair of shoes. All of the twenty-two reported cases of skin contamination were easily decontaminated, and none constituted an exposure problem. 100 air samples were taken; none indicated activity densities greater than the permissible limits for respiratory protection worn.

- E. Events Influencing Costs - 270.9 nonexempt and 6 exempt overtime manhours were required. A water leak outage and an extensive (scheduled) maintenance outage for problem tube work and installation of new straight type rear face connectors were the major factors contributing to the 164.7 hours total downtime incurred.

POWER OPERATION

- A. Operating Experience - At 8:53 PM on February 9, two insulators on the middle phase of line E2X26 went to ground, resulting in the loss of C2L1 from the 151-B Substation. The insulators were replaced and the system restored to normal at 2:55 AM, February 10. The reactor continued to operate through this incident.

Electrical Distribution discovered water leaking into the junction box for electrical cables from 151-B to 190-B. The water was pumped out and a break in the Fire and Sanitary header at the southwest corner of 190-B Tank Room was isolated, which stopped the water flow.

- B. Equipment Experience - The gantry crane hoist at 181-B was replaced with the ten-ton hoist from 190-B, and the 190-B hoist with a three-ton hoist from 108-B. At 182-B a baffle box was installed on No. 4 export motor to reduce the motor noise. At 183-B, No. 9 north and No. 12 south backwash valves were replaced. At 183-C, No. 10 and No. 14 high lift pumps were Class A inspected. At 190-C, No. 4 clearwell tank was inspected. The oil inhibitor in No. 5 fluid drive broke down, allowing an organic deposit to form; solvent was used to remove the deposit and the oil was changed. Adjustments have been made on all units to allow for maximum scoop travel and full clutch engagement of the fluid drives.
- C. Improvement Experience - CG-600 - Number 5 pump impeller was shipped to Byron-Jackson for modifications. 58-IP-47 - "3500 HP Induction Motor Power Loss Relays - 190-C" - Trial runs with the relays tied into the annunciator circuit rather than the reactor scram circuit were continued. Project A-89053 (Process Water Cross Tie) - The flow controller arrived on site and installation will begin immediately. 58-IP - "Aluminum Oxide-Sulfuric Acid Feeders - 183-B" - Design changes are being made in the prototype feeders to improve the dependability of the units; project scoping is being continued. Project CA-696 - "Coal Car Shakers - 184-B" - This project was accepted with minor exceptions.

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- D. Events Influencing Cost - The raw water turbidity fluctuated during the month, requiring increased alum and Separan feeds and resulting in higher water treatment costs. Maintenance costs remained high due to the change in hoists at 181-B and 190-B, the replacement of two backwash valves at 183-B, the Class A inspection of two high lift pumps in 183-C, and the work on the fluid drive scoops in 190-C.

MAINTENANCE OPERATION

- A. Equipment Experience - Twelve outage hours were required to recover a poison charge which was inadvertently discharged onto the front elevator at B. Material was remotely picked up and secured in water casks for disposal. The ball valve was replaced and the tube was restored to service. Modifications were made to the charging machine to preclude a similar accidental elevator movement, which caused this incident.

353 trip gauges were installed at B for a total of 1351 to date. During the February 2nd outage at C, six empty channels were retubed and two problem channels were drilled out. 204 straight nozzle connector assemblies were installed at C as part of the program to correct rear face water leaks. During the February 20th outage at C, 131 process tubes were leak tested; two leaks were corrected. Productive Maintenance check of the 12-C deep well pump at 181-B disclosed a bent and scored shaft; repairs have been completed. Installation of a 10-ton electric powered hoist was completed at 181-B to facilitate overhaul of pumps. Extensive work was performed during the month on modifications of 190-C pump controls to permit automatic operation.

Two unexplained trips occurred on the 105-B Beckman system; scrams were prevented by the dual trip system, justifying the installation. The majority of the B rear face TV monorail was removed; this is the first phase of the rear face clean up in anticipation of flush discharge.

- B. Maintenance Engineering - C Reactor Effluent Water Thermocouple Replacement - The three samples of thermocouple wire furnished by the vendor failed to meet the moisture migration tests. Certain modifications to specifications will be made to assist the vendor in producing an acceptable thermocouple wire. The vendor will furnish a fourth sample of wire, using the modified specifications. If this sample is acceptable, the production order can begin and delivery of the wire can be expected by May 1, 1959. Gas Moisture Detection System - B and C Reactors - The gas moisture detection system at B Reactor has continued to operate without any difficulties with the primary elements. A check of the refrigerator temperature revealed the temperature in the refrigerator was approximately 0°F when the temperature controller indicated 55°F. The temperature sensing bulb was relocated to correct this condition. At C Reactor, new vacuum pumps were installed to keep the sensing lines free of condensate. However, the Dewcell chambers have not been modified according to B Reactor, and the increased flow caused several Dewcells to become inoperative.

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Flush Discharge System - B and C Reactors - In order to utilize a portion of charge-discharge time for rear face maintenance work, it is desirable to adopt a method of flush discharging. With this method, it is possible to cap the rear nozzles and proceed with the charging of the tubes while maintenance work is being done on the rear face. Necessary designs of the system have been completed and a report is being prepared describing the flushing system and a procedure for its use.

Leak Testing Stingers - B and C Reactors - Considerable difficulty has been experienced in using the existing leak testing stingers at B and C Reactors. A design and drawings of a new type stinger for leak testing B Reactor front face nozzles have been completed. Special stingers for use with the ball valves at each reactor are currently being designed by Mechanical Development "A" Operation.

D Elevator Geared Limit Switch Installation - B and C Reactors - The design changes have been completed and issued for approvals.

The following drafting work was completed during the month: 11 new instrument drawings, 6 new mechanical drawings, 4 new electrical drawings, and 2 drawings revised and as-built.

- C. Planning and Scheduling - During February, 3335 manhours of Productive Maintenance work were scheduled. This included 2320 manhours scheduled for February and 1015 manhours carried over from previous months. The total included 63 Class A overhauls, 303 Class B overhauls, 47 Class C overhauls, and 8 lubrications. Of this total, 2276 manhours, or 69 percent, were completed. Reasons for non-completion were: Jobs in progress, 5%; shutdown items, 11%; equipment not available, 5%; insufficient manpower, 10%; total 31%. During this period, equipment condition dictated changing 13 Class A overhauls to Class B, 8 Class B to Class A, 1 lubrication to Class B, and 1 Class B to Class C.
- D. Events Influencing Costs - The extensive outages at 105-C for problem tubes, straight pigtailes, thermocouples and leak testing increased the applied labor costs.

A.R. Maguire
Manager
B-C REACTOR OPERATION

AR Maguire:ILH:mbc

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D-DR REACTOR OPERATION
FEBRUARY, 1959

I. ORGANIZATION AND FUNCTIONS

Effective February 1, the responsibility for providing IPD safety and fire prevention engineering coverage in 100-D, F, and H and White Bluffs Areas was transferred from Employee Relations Operation to D-DR Reactor Operation. This function will be performed by a Specialist, Safety and Fire Prevention, reporting to the Manager, D-DR Reactor.

Also during February, responsibilities for control and administration of the Nonexempt Personnel Development Plan were assigned to the group as part of the Employee Relations reorganization program.

II. PERSONNEL

	<u>Jan. 31, 1959</u>			<u>Feb. 28, 1959</u>			<u>Net</u>
A. <u>Force Summary</u>	<u>NE</u>	<u>E</u>	<u>Total</u>	<u>NE</u>	<u>E</u>	<u>Total</u>	<u>Change</u>
General	3	4	7	3	5	8	+1
D Processing	39	16	55	39	16	55	
DR Processing	35	16	51	35	17	52	+1
Power	102	15	117	100	15	115	-2
Maintenance	<u>124</u>	<u>22</u>	<u>146</u>	<u>130</u>	<u>22</u>	<u>152</u>	<u>+6</u>
Total	303	73	376	307	75	382	+6

B. Movement of People

Effective February 1, the following changes in assignment were made in D-DR Reactor Operation: E. J. Filip, Manager, D Processing Operation, was transferred to KW Processing Operation in the same position. J. T. Baker, Manager, KE Processing Operation, replaced E. J. Filip as Manager, D Processing Operation. These were two of several transfers among Processing Managers for development purposes. L. P. Forby, Specialist, Safety and Fire Prevention, Employee Relations Operation, was transferred to D-DR Reactor Operation in the same position. K. R. Ridgway, Analyst, Shift Processing, Redox Operation, Chemical Processing Department, was transferred to Assignment Supervisor, DR Processing Operation.

Nonexempt personnel movement during February included eight transfers in, four transfers out, one reactivation, two deactivations, and one new hire. One employee in deactivate status was terminated due to death.

III. PERSONNEL ACTIVITIES

J. D. Ryan, Specialist, Administrative Programs recently transferred from the Chemical Processing Department, spent two weeks on the 4-12 shift with the D-DR Reactor Processing and Power Operations for orientation and training purposes.

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IV. SAFETY AND SECURITY

There were 9 medical treatment injuries reported during the month. Coordination was provided in developing a special artificial respiration instruction poster for IPD-wide use in placing 100 airways for the mouth-to-mouth method in various 100 Area buildings.

There were no security violations during February.

V. NON-ROUTINE REPORTS

None were issued.

VI. INVENTIONS AND DISCOVERIES

All personnel engaged in work that might reasonably be expected to result in inventions or discoveries advise that, to the best of their knowledge and belief, no inventions or discoveries were made in the course of their work during February. Such persons advise further 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 and discoveries.

VII. COMPONENT ACTIVITIES

A. Administration

Preparation of five nonexempt position descriptions was coordinated within D-DR Reactor Operation as part of the HAPO program to redescribe and reevaluate nonexempt, non-bargaining unit positions.

Three meetings of suggestion evaluators were held during February to explain details related to suggestion evaluation. Suggestion statistics for the month were:

Suggestions by D-DR Reactor Employees:

In process at beginning of month	54
Submitted	23
Reopened	0
Completed	37
In process at end of month	40

B. Personnel Development

Procedures for control and administration of the Nonexempt Self Development Program were revised in line with the transfer of this function from Employee Relations.

One rotational pool technical graduate was on assignment to D-DR Reactor Operation throughout the month.

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C. Cost Control

Data for the Operating Expense and Equipment budgets for FY-1960 and FY-1961 was developed during the month and submitted to the Financial Operation for use in detail budget preparation.

A cost meeting was held by the Financial Operation representative on February 18. The topic discussed was the over-all cost of producing plutonium and the effects of concentrations and E metal burnout upon cost.

The D-DR Reactor Operation Space Occupancy expenditure pattern for the remainder of FY-1959 was reviewed with the Financial Operation representative to consider various means for reduction of current overliquidations in this account.

D. Landlord

During the month, the 100-D Area Duplicating facilities were moved from Building 1717-D to their new quarters in Building 1719-D Annex. Alterations to Building 1707-D, used by HLO personnel for offices, were completed during the month.

D PROCESSING OPERATION

A. Production

Input production was 119.2 per cent of official forecast. Maximum operating levels were limited when the maximum allowable tube powers were reached.

Time operated efficiency for February was 92.0 per cent, which was 112.3 per cent of forecast.

B. Operating Experience

1. Operating Continuity

There were three outages during the month. A scram during spline insertion and an unsuccessful recovery caused an outage during which scheduled shutdown work was completed. Two Beckman scrams occurred during the month.

<u>Date</u>	<u>Hours</u>	<u>Reason</u>
2-1-59	53.2	Scram - Spline insertion in 2573-D. Down for scheduled shutdown work.
2-5-59	.3	Scram - Unexplained Beckman trip.
2-5-59	.2	Scram - Unexplained Beckman trip.
Total	53.7	

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2. Equipment Experience

a. Tube Probologging

During the 2-1-59 outage, 47 tubes were probologged. There were 18 tubes found to have external corrosion. All of these tubes were below row 5, which is the region where external corrosion is known to exist. In addition, three tubes were found with wall thickness less than 33 mils. These 21 tubes, now charged with solid aluminum pieces, are scheduled for replacement in March.

b. Splines

During the 2-1-59 outage, 22 splines were inserted to provide a total of 29 splines in the reactor for turnaround control. Removal of 14 was accomplished without difficulty following turnaround. The remainder were left in the reactor for flattening control. Spline statistics for the month include:

Total splines inserted	48
Total splines removed	40
Balance in reactor	20

On 2-1-59 a scram occurred during insertion of a spline. The scram was caused by the spline passing through the center of the upstream dummies to the front of the metal resulting in a flow restriction and a Panellit scram. During the outage, all spline cap seals were replaced with new seals. Since the splines frequently bind in the first 10 feet of the tube, a practice was initiated of placing a slight downward bend in the first 2 feet of spline before inserting it through the spline caps. This technique has proven helpful. The frequency of successful insertions has improved during the last two weeks of the month. However, the difficulty with which the splines enter the reactor still remains a problem.

C. Improvement Experience

1. CG-740 - "Replacement of Central Viewers"

Replacement of the broken lead glass viewer was accomplished during the month. The installation is now complete.

2. CG-791 - "Exhaust Air Filtration"

Approximately one hour was spent photographing the rear face to provide information for planning the prefabrication of the fog spray header.

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D. Radiation Monitoring Experience

1. Radiation Occurrences

Two radiation occurrence reports were issued during the month. One, a lapse of radiation control, occurred when a Ring Balance instrument was removed from the inner instrument room without monitoring and without provision for closing the lines from the main gas system. Gas leakage into the room resulted in conditions requiring fresh air masks for re-entry.

2. External Exposure Control

D Processing Operation's Radiation Monitors accumulated an average of 504 mr gamma exposure during the 8-week period ending February 11. File and Utility Operators accumulated an average of 396 mr during the same period. This represents an increase of 5% in Monitors' exposure over the comparable period in 1958, and a decrease of 8% for Operators on the same basis.

Special film badges, used during spline removal, show that crews receive an average exposure of 18 mr/spline. This is a significant exposure reduction from initial spline experience when the average was 93 mr/spline.

3. Contamination Experience

A routine survey of the transfer area revealed contamination up to 2.2 rads/hr, including 50 mr/hr @ 2" on the jaws of a pair of pickup tongs.

E. Events Influencing Costs

No unusual variations in controllable costs are expected in the February report.

DR PROCESSING OPERATION

A. Production

Input production was 147% of the official forecast. Time operated efficiency was 99.9% which was 128% of the official forecast. The forecast was predicted on the basis of an outage to replace process tubes. However, the anticipated work was performed in January instead to correct the leak problem that existed at that time. The maximum power level attained was 120 units higher than any previous level, and the total production was 12.3% higher than any previous month.

B. Operating Experience

Continuity of operation was broken by one scram.

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HW 59456

1. Operating Continuity (Con't.)

<u>Date</u>	<u>Hours Lost</u>	<u>Cause</u>
2-2-59	0.3	Faulty jumper caused trip of panellit circuit during discharge of PCCF tube 2167-DR.

2. Equipment Experience

Process Tube Leaks

Tube replacement in January reduced the water collection rate to less than 10 gal/day. This level was maintained throughout the month.

Building Sewers

Water from the near sample room was re-routed to bypass a 12" line on the north side of the 105 Building and eliminate personnel exposure from that line. It will now be possible for Construction Operation to continue hydrostatic tests of leaking sewers.

C. Improvement Experience

1. Production and Process Tests

Except for short term irradiations in the Poison Control Column Facility tubes, no changes were made in special loading tubes. The end of the month status is as follows:

<u>Test No.</u>	<u>Description</u>	<u>Tubes Charged at End of Month</u>
PITA-IP-4-I	Use of I & E E-metal at B, D, DR, F and H	98
PITA IP-6-I	Central Zone Loading of I & E into DR Reactor.	1326
PT-IP-081-A	Irradiation of Fuel Elements having Blunt Nose Tru Line Contours (M-388 cans)	100

2. Projects

AEC-160 Recirculating Gas Loop

Construction was resumed after a temporary curtailment in January due to an equipment procurement problem.

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D. Radiation Monitoring

1. Radiation Occurrences

One lapse of radiation control, adjudged at a severity of 7, was experienced during the month. The lapse resulted from storage of reclaimed irradiated poison outside at 1608-DR without proper radiation zone posting. The cans containing the poison read 200 mr/hr at the sides.

2. External Exposure Control

Three employees received whole body dose rates of 3 r/hr during burial of irradiated dummies and tubing. Other dose rates received by personnel associated with burial operations during the month ranged from 150 mr/hr to 2.0 r/hr.

Dose rates in the near downcomer, associated with the repair work, have ranged from 35 mr/hr to 800 mr/hr in the different bays. The maximum rate encountered was 1 r/hr.

3. Contamination Experience

Eight cases of skin contamination and five cases of personal clothing contamination was experienced. All except one case of each type resulted from effluent vapor associated with the work in the near downcomer. These latter cases involved Construction Operation personnel with skin contamination of 6000 c/m received on X-1 level and clothing contamination of 1000 c/m received while handling contaminated equipment.

There were two cases of contamination spread out of radiation zones. The more significant occurred during burial operations when water was spilled to the roadway contaminating a 200 sq. ft. area to 4000 c/m.

E. Events Influencing Costs

No unusual variation in controllable costs are expected in the February report.

D-DR POWER OPERATION

A. Operating Experience

Water treatment has been satisfactory during the month with the exception of an increase in the raw water turbidity. This condition has reduced filter runs and increased chemical feed at each of the water plants. Hagan filter aid was discontinued and Separan filter aid was started at the 183-D water plant with the exception of Number 9 filter at 183-D, in use for Fire and Sanitary water.

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HW 59456

A. Operating Experience (Con't.)

Boiler operation was satisfactory during February. The steam generating load was 103,674 pounds per hour average and 135,000 pounds per hour maximum. The average evaporation rate was 8.86 pounds of steam per pound of coal.

B. Equipment Experience

182-D Building

Fabrication of portable acoustical walls for noise control was completed this month. The acoustical walls can be transported to any location in the pump room.

190-DR Building

Replacement of the new design impellers, wear rings and enlarged shaft of No. 6 process pump was completed this month and a performance and production test conducted. (See HW-59074).

C. Events Influencing Costs

No unusual costs are anticipated for February.

D-DR MAINTENANCE OPERATION

A. Equipment Experience

1. Instruments

a. Temperature Monitor System

105-D

The Giannini prototype II temperature logger unit has been restored to serviceable condition and is in use while the Giannini encoder is being adapted for use with a Fisher-Porter chassis. This adaption work is progressing satisfactorily with Instrument Development assistance.

105-DR

A Delta set point selector was fabricated and installed on the Digital Temperature Converter. Processing Operation personnel can now set up for a Delta temperature map without the aid of an Instrument Technician.

2. Electrical

184-D - An instantaneous trip coil was installed in each over current protective relay on the following 2300 V breakers: #4X38 Fence lighting E4X37 Station auxiliary, E4X34 Power house emergency feeder, and E4X33,

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2. Electrical (Con't.)

the emergency line. The relays were all tested and adjusted.

Additional undervoltage relays were installed on the incoming line breaker to insure correct breaker operation on a single phase condition.

190-D-DR - The following motors were opened up for inspection and for bull ring and tie repair: D-2, D-8, DR-6, DR-8.

3. Mechanical

105-DR- Work on permanent modifications to the near downcomer has been in progress for the past three weeks. The modifications consist of reinforcing the tray beams, perforating the trays, making weir cuts in the top half of tray I-beams, and channel reinforcing of the side walls opposite each baffle tray. Work is progressing as fast as exposure of Boilermakers is available. At the present time this work is 30% complete. Ten men per week are borrowed from CPD for exposure work, generally on an overtime basis.

190-D-DR - The following process pumps were removed and sent to the White Bluffs machine shop for inspection and repair:

2 - D

8 - D

B. Shift Maintenance Activities

No significant report.

C. Maintenance Engineering

1. Instrument Engineering

Reactor Safety Circuit Trip Identification

The appropriation request forwarded for this work ran the amount being expended by the department over \$20,000. A review of the design of the proposed circuit shows that it, together with all other Panellit coordinate lighting designs, contains "sneak" circuits which would inadvertently bypass gauges under certain conditions. Thus both the financial and design aspects of this proposal require further clarification before further action is taken. Neither problem is insurmountable and work toward filling this instrumentation need will continue.

190 Storage Tank Cone Valve Control

Excessive corrosion has been experienced in the cone valve controller filtered water actuating system. Both untreated condenser water and air were tried as alternate media. Air was the most satisfactory solution and all cone valve controllers are being converted to air operation.

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2. Electrical Engineering

Provide Arc Suppression Circuit for BK Relays of the 105-D Building

Reactor scrams have resulted from a high trip of one Beckman controller inducing a low trip of another one. A possible cause of this interaction is the arc produced when current to a BK relay coil is interrupted. Arc suppression circuits connected in parallel with the relay coils should eliminate this arc and prevent scrams from this cause. The design change to accomplish this is being prepared. Installation is planned for the next scheduled outage.

Front Face Elevator Protrusion Protection

The recent incident at 105-B occasioned an evaluation of the protective devices on the front face of D and DR reactors. Preliminary discussions reveal that the scope of protection needed is beyond that which the current electric eye equipment can provide. The protective needs must be more specifically defined before an improved device can be designed.

3. Mechanical Engineering

Emergency Entrance Room Viewer 105-D

A lead glass window has been ordered with an expected delivery date of July. The window will be mounted to provide an unobstructed view of the rear face from the 30' far catwalk lead shielded room.

Alternate to Cross Under Line

Material has been ordered for installation of an eight inch drain in the near rear riser at 105-D. This, coupled with the existing 4" and 6" drains in the far riser, should provide adequate drainage of the rear risers during shutdown flow. It is anticipated that the new 8" drain will be installed during the next scheduled outage, after which flow tests will be conducted to determine whether the rear risers can be used as drain risers, thus eliminating the rear valving operation.

Rear Face Decontamination

Plant Engineering is currently preparing a scope report as a preliminary to project action for all reactors. D-DR facilities will be included in this proposal.

Pickup Chute Viewers

Revised specifications were issued to prospective vendors and a review of the submitted bids indicates that chute viewers may be procured off-site at approximately one-third the cost of shop fabricated viewers. Fifteen viewers from an off-site vendor are being procured on a trail basis.

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Improve Ball 3X Recovery Equipment

Material for a prototype graphite breaker has been ordered. The prototype "G" breaker consists of an air operated scaling hammer which may be inserted into a VSR channel and controlled from the top of the unit via a long pole. This should reduce the time required to break up large displaced graphite pieces in the VSR channels.

The prototype ball recovery hose tip fabricated in January was tested and found to have one serious drawback; burying itself in the channel of balls thus cutting off the air flow. Mechanical Development is preparing a scope report for Ball 3X revisions and will follow through to project completion.

4. Planning and Scheduling

During the month the following PM work was done:

Inspections and overhauls - 15 Class "A"
67 Class "B"
78 Class "C"

D. Events Influencing Costs

During the month it was necessary to use overtime as follows:

Nonexempt - 746.3 manhours
Exempt - 133 manhours

Manager
D & DR Reactor Operation

JH Brown:JDR:ab

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HW-59456

F REACTOR OPERATION
FEBRUARY - 1959

I. ORGANIZATION AND FUNCTIONS

No change in assigned responsibilities.

II. PERSONNEL

A. Force Report

	<u>January 31</u>			<u>February 28</u>			<u>Net Change of Total</u>
	<u>E</u>	<u>NE</u>	<u>Total</u>	<u>E</u>	<u>NE</u>	<u>Total</u>	
General	2	1	3	2	2	4	+1
Processing	15	38	53	15	37	52	-1
Power	7	51	58	7	51	58	0
Maintenance	14	73	87	14	72	86	-1
Total	38	163	201	38	162	200	-1

B. Movement of People

S. L. Nelson, Manager - F Processing Operation, transferred to KE Processing Operation.

R. G. Clough, Manager - B Processing Operation, transferred to F Processing Operation.

R. E. Anderson, Specialist - Administrative Programs transferred from IPD Employee Relations to F Reactor Operation.

G. B. Jex, Specialist - Administrative Programs, was deactivated due to personal illness.

Nonexempt personnel moves consisted of three transfers out, two transfers in, and one reassignment within the Operation.

III. PERSONNEL ACTIVITIES

Three personnel participated in scheduled IPD training programs.

IV. SAFETY AND SECURITY

Effective February 20, 1959, F Reactor Operation gained its ninth of fourteen operating years without a disabling injury. There were seven medical treatment injuries reported. No disabling injuries and no security violations were reported.

V. NONROUTINE REPORTS ISSUED

Trip Report, "Tenth National Plant Maintenance and Engineering Conference," E. J. O'Black, dated February 26, 1959.

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VI. INVENTIONS AND DISCOVERIES

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

VII. COMPONENT ACTIVITIES

GENERAL

A. Administrative Activities

Final arrangements were made and a procedure completed to initiate the operation of a 100-F Motor Pool, effective March 2, 1959.

Arrangements were made with the Specialist - Suggestion Administration, to conduct a total of eight seminars (two for each shift) to discuss problems and answer questions concerning the suggestion procedure in regards to evaluation responsibility. Two seminars were completed.

B. Cost Control Activities

Budgets - FY 1961 and Review of FY 1960, including Plant Acquisition and Construction, Personnel Requirements and Overtime Hours, Essential Materials, and Planned Maintenance - were completed and submitted to the Financial Operation during the month.

C. Landlord Activities

Lighting was increased in the 190 Annex offices to meet standard office requirements.

Work on Phase II of the rearrangement of the 1717-F Maintenance Shops continued.

D. Suggestion Plan Activities

To be evaluated - start of month	35
Received for evaluation	12
Evaluated and returned	21
Unanswered - end of month	26

F PROCESSING OPERATION

A. Production

F Reactor production was 148.7 per cent of forecast during February with a time-operated efficiency of 100 per cent. The ACRS limit was removed on February 1, and step-wise tube power increases were initiated. Previous maximums in daily level and daily production were exceeded by 115 units.

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B. Operating Experience

1. Operating Continuity

There were no interruptions to reactor operation during the month.

2. Equipment Experience

Water collection rate was constant at 12 to 18 gallons per day. Leak testing and tube replacement are scheduled for the next outage.

C. Improvement Experience

Nothing to report.

D. Radiation Monitoring Activities

1. Radiation Occurrences

No radiation incidents and one lapse of control were incurred by F Reactor Operation this month.

2. External Exposure Control

External exposure control experience was favorable. A significant increase in neutron flux on the reactor charge face to 17 mrem/hour was noted in conjunction with new record power levels. The increase of gamma flux was not significant at this point nor were corresponding increases in neutron flux noted on other accessible faces of the reactor.

3. Contamination Control Experience

Contamination control experience was favorable.

F POWER OPERATION

A. Operating Activities

1. Raw water turbidity varied from a minimum of 9 ppm to a maximum of 140 ppm. Water level control for the east and west 183 Building clearwells was lowered from 11.5 feet to 10.0 feet; this increased filter flows.

B. Equipment Experience

1. The stator for No. 2 process water pump motor at 183 Building was removed on February 24 and sent to Spokane, Washington, for necessary repairs to coils and wedging. The pump impeller for this unit was in good condition.
2. Reassembly work to correct vibration on No. 10 raw water pump at 181 Building is 60 per cent complete.

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C. Improvement Experience

1. Project CG-558 - 190 Building Annex

No. 8A annex pump was disassembled on February 2 for inspection and necessary preliminary work (completed) for installing newly designed rotating assembly case wear rings. Pump shaft bearing brackets were re-aligned to pump case ring bores. A rebuilt first stage PW-1417-1 impeller wheel with shrink fit wheel rings was installed. The No. 2 bearing was inspected and found in good condition. Pump unit was placed in service on February 20 and No. 5A pump removed from service. Due to the re-alignment work on 8A pump, the temperature on the gear pinion shaft bearing increased to approximately 4 C, and it was removed from service the same day. No. 5A was again placed in service. Re-alignment of No. 8A pump is in progress under the direction of Project Engineering Operation.

2. Project CA-696 - Coal Car Shake Outs

All work in connection with this project is complete except for painting and completion of Punch List items.

3. Facilities for Unloading and Storage of Liquid Dichromate

Facilities were placed in service on February 26. Approximately 4800 gallons of 63 per cent solution were transferred from 100-H Area storage to 100-F Area on February 26 and 27. Installation work is completed with the exception of painting.

4. 183 Head House Treated Water Sample Pumps

Two single stage centrifugal pumps were installed in the 183 Head House to transfer treated water from the east and west basin distribution flumes to central sampling station in the head house laboratory.

5. Small Hoist Installation

Small hoist installation at 183 Building for lifting metal gage rods from acid storage tanks was completed.

D. Events Influencing Costs

Items which will increase costs are:

1. Class "A" overhaul on No. 10 raw water pump at 181 Building.
2. Chemical unit treatment cost decreased approximately 6 per cent under previous month report. The unit cost of steam generation increased approximately 4.4 per cent over previous month due to 57 per cent consumption of higher cost storage of pit coal. Total coal consumption costs decreased approximately 9.6 per cent due to lower steam demands because of no shutdown during the period.

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F MAINTENANCE OPERATION

A. Equipment Experience

1. Instrument

An additional graphite thermocouple stringer assembly was fabricated and is scheduled for installation during the next reactor outage. This assembly has special interest since it contains an experimental-type neutron detector element.

The current rehabilitation program of the moisture monitor Dewcell equipment is 90 per cent complete. A test run of the equipment is in progress to determine the effectiveness of the system in locating reactor water leaks and the costs required to maintain the system.

Approximately 76 per cent of the pressure monitor Panellit gages have been modified to include the 10-90 trip settings. Forty-six gages were transferred from the F to H Reactor Operation inventory to expedite the H Panellit modification program.

2. Electrical

The inspection and repairs of the No. 8A process pump motor winding was completed. Only four slight corona damage spots were apparent; a few retainer rings were tied.

Six additional lights were installed around the top of the "C" elevator catwalk.

3. Mechanical

The three-stage air compressor in the 115 Building purification room was completely overhauled.

Class "B" inspections of the 190 Nos. 10, 11 and 12 turbines and pumps were completed. Main activities consisted of replacing the pump packing and changing oil in the couplings. The inboard bearing on No. 11 turbine was found to be partially wiped. This bearing was cleaned and restored to service.

Installation of another ten manhole rings and covers for underground process sewer lines was completed.

B. Maintenance Engineering

1. 105-F Rod Water Instrumentation

A design change has been completed to cover the revisions of the horizontal rod cooling water instruments. Purchase specifications have been prepared for the required instruments.

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2. 105-F High Tank Level Control

A study of the high tank float valve operation revealed leakage and inadequate shut-off due to the double seat design of the valve. Purchase specifications were issued for a suitable replacement.

3. 107-F Effluent Water Monitor Instruments

An appropriation request was issued for the replacement of existing obsolete radiation instruments. A study was undertaken to determine the most favorable location for maximum reliability.

4. Design Change No. 267-F - "Pressure Monitor Raw Relay and Ground Detector Test Box"

Design Change No. 267-F was completed and will provide a ready check of the Panellit system prior to a reactor start-up.

5. Power and Lighting Circuits, 185, 189 and 190 Buildings

A study was started to determine the feasibility of isolating the 190 Building power and light circuits from the 185 and 189 Building systems.

6. Control Room Air Conditioner, 105-F

An engineering study was completed on the replacement alternates of the existing system. Purchase requisition was issued for a specific air conditioner unit.

7. Charge Seater - 105-F

The engineering scope to modify the ram-rod charge seater to a chain-ram type to permit a one-man operation was completed and parts ordered.

8. Process Pumps Cooling Water - 190-F

An estimate was prepared for the substitution of raw water for filtered water as the cooling medium of the process pumps.

9. Covers for High Tank Valve Pits

An estimate and design were prepared for the reinforcement of the structural members to permit the operation of a fork lift truck with a load of metal to travel over the existing metal floor covers.

C. Planning and Scheduling

1. Property Control

Seven truck loads of miscellaneous materials were disposed of during the month.

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2. Productive Maintenance

Approximately 22 per cent of available manpower was assigned to Productive Maintenance work including the completion of six Class "A" overhauls and 226 Class "B" overhauls.

D. Events Influencing Costs

Due to the absence of a reactor outage, a related reduction in costs and overtime was experienced. The February costs will reflect an expenditure of approximately \$11,547 to cover the costs of bourdon tubes, Panellit jumpers, air conditioners, air motors, and tool cabinets.

MANAGER, F REACTOR

CN Gross:REA:det

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H REACTOR OPERATION

February, 1959

I. ORGANIZATION AND FUNCTIONS

Effective February 1, 1959, H Reactor Operation was assigned the responsibility for administering and functionally guiding LPD activities related to procurement of all bargaining unit nonexempt employees, and transfer, rotation and termination of all bargaining unit nonexempt employees except Processing operators.

II. PERSONNEL

A. Force Summary

	<u>January 31</u>			<u>February 28</u>			<u>Net Change of Total</u>
	<u>E</u>	<u>NE</u>	<u>Total</u>	<u>E</u>	<u>NE</u>	<u>Total</u>	
General	3	2	5	3	2	5	0
Processing Operation	15	39	54	16	39	55	+1
Power Operation	9	51	60	8	52	60	0
Maintenance Operation	14	62	76	14	63	77	+1
Cent. Maint. Oper.	16	99	115	17	104	121	+6
Total	57	253	310	58	260	318	+8

B. Movement of People

J. H. Tarpenning, Supervisor, 100 Power I, was reassigned as Assignment Supervisor, Maintenance Operation within H Reactor Operation. J. R. Wood was reassigned from Supervisor Tool Crew to Supervisor, Special Maintenance within Central Maintenance Operation. M.W. Tattu was reassigned from Supervisor, Shift Maintenance to Supervisor Tool Crew within H Reactor Operation. V. L. Wallace and C. L. Owen, Specialists, Reactor Operations were transferred to KE-KW Reactor Operation in exchange for H. A. Yount and W. J. Tatum. M. L. Smith, Analyst, Radiation Monitoring was transferred to Research and Engineering Operation and replaced by F. E. Owen, Jr. from Chemical Processing Department. K. L. Fowler was transferred from CPD as Assignment Supervisor in Processing Operation. W. H. Nicks was reassigned from Supervisor, Central Maintenance Planning and Scheduling to Supervisor, Central Maintenance Planning, Scheduling and Engineering. A. C. Rediske, Instrument Specialist, was temporarily promoted to Supervisor, Special Maintenance for the period February 9 through 22, to provide illness relief.

Nonexempt personnel movements in February included four transfers out, seven transfers in, one deactivate, two reactivates, and three rehires.

III. PERSONNEL ACTIVITIES

F. C. Meckle, Lieutenant Commander USNR, attended a two-week training

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course at the U. S. Naval Guided Missile School at Pomona, California.

IV. SAFETY AND SECURITY

There were no disabling injuries, near-serious incidents, radiation incidents or security violations during the month. A total of 12 medical treatment injuries were reported.

V. NONROUTINE REPORTS

None

VI. INVENTIONS AND DISCOVERIES

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

VII. COMPONENT ACTIVITIES

General

- A. Administration Activities - Coordinated within the Operation preparation of eight nonexempt nonunit job descriptions as a part of the IPD study of these types of jobs.
- B. Personnel Development - Five exempt employees continued participation in the fifth presentation of Professional Business Management I. One secretary participated in the Secretarial Proficiency course. Fourteen exempt employees were enrolled in a total of four IPD training courses. One Technical Graduate was on rotational assignment at month end.
- C. Cost Control Activities - The following budgets were prepared and submitted: Plant Acquisition and Construction, Personnel and Overtime Requirements, Essential Material, Planned Maintenance and Equipment not Included in Construction Budgets.
- D. Landlord Activities - The landlord representative discontinued coordinating telephone changes within 100-H Area except for the addition of new telephones.
- E. Suggestions - At start of month, 35; received for evaluation, nine; evaluated and returned, seven; balance at month end, 37.

H Processing Operation

A. Production

Input production exceeded the forecast by 12 per cent. Lower than expected

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time operated efficiency resulted from two enriched metal rupture outages. Power levels were governed by programmed incremental increases in operating limits. A new high level 90 units above the January record high was achieved.

B. Operating Experience

1. Operating Continuity

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

<u>Day</u>	<u>Hours</u>	<u>Reason</u>
16	77.9	Shut down for I & E enriched rupture which caused water leak in 0482-H. Outage work included charge-discharge and tube replacement.
24	31.7	Shut down for I & E enriched rupture in 4280-H. Outage work included a small charge-discharge and miscellaneous maintenance items.
26	1.1	Scram due to SMN relay not making up because of dirty contacts on No. 57 VSR limit switch.

2. Equipment Experience

- a. Rear Pigtails - An additional 37 O-ring pigtails were installed, bringing the total to 1703. Performance behavior of the new connectors has been very good to date.
- b. VSR's - The final four modified VSR's were installed, completing the present program.
- c. Downcomers - Inspection of the near downcomer revealed that vent pipes were in sound condition as compared to recent opposite findings in the far downcomer.
- d. Discharge Elevator - The bull gears which had shown serious wear were replaced, and a new electric drive motor was installed.

C. Improvement Experience

- 1. Overhead Charging Machines - Fabrication of the new machines was started, as well as other modification work to improve charging rates on "C" elevator.
- 2. Process Water Low Pressure Trip - Design Change 257-H authorized removal of the trip from the safety circuit, eliminating a potential source of unnecessary scrams without compromising reactor safety.

D. Radiation Experience

The discharge of two ruptured slugs raised radiation levels in the discharge area in the vicinity of the rupture tubes. Otherwise, radiation

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levels remained essentially unchanged .

1. External Exposure - Exposure for H Maintenance Operation pipefitters and welders averaged about 30 per cent above the 3 r/year curve. The average exposure for all other H Reactor Operation groups was below the curve. Individually there were 12 people in H Reactor Operation above the 3 r/year curve.
2. Contamination Control - Five cases of skin contamination, two of personal clothing contamination and one spread of contamination outside of radiation zone were experienced this month.

E. Events Influencing Costs

Overtime requirements for the month consisted of seven hours for operators and 0.5 hours for monitors.

H Power Operation

A. Operating Experience

The average steam generating rate was 50,000 lbs/hr, with an evaporation rate of 7.24 pounds of steam per pound of coal. On two occasions during the month, the power factor on the 190-H Building annex pump motors was adjusted to 0.88 lead to assist low voltage conditions at 151-H Building. Standard quality water was produced throughout the month with an average alum and separan feed of 4.7 ppm and 0.004 ppm respectively. Pit coal was burned the greater part of the month to reduce inventory. Rocks in the coal have not been a major problem to date, although damage was incurred to one stoker as a result.

B. Equipment Experience

Building 181-H - An A inspection of No. 8 river pump motor showed it to be in good condition except for improper adjustment of the thrust bearing.

Building 183-H - The running assembly of No. 3 filtered water pump was removed for impeller replacement by Minor Construction forces. New impellers are being provided by the DeLaval Company since these units are cavitating to varying degrees. Work was not complete at month end.

Building 184-H - Smouldering coal was transferred from No. 4 bunker to operating boilers Nos. 1 and 2 during the early part of the month. One-inch drain lines were installed on the boiler feedwater headers to Nos. 3 and 4 boilers. The larger lines facilitate maintenance as recommended by an accident investigation committee. The larger lines will be installed on the two remaining boilers as they become available.

Building 190-H - The installation of check valves, orifices and minor piping revisions was completed on the liquid dichromate transfer pumping facility. Minor Construction forces completed grinding work on Nos. 4 and 8 annex pump cases under the direction of a DeLaval Company field representative. The same running assembly was reinstalled in No. 4 pump, but a new design running element was installed in No. 8 unit. During disassembly of No. 8 motor, several wedges were observed to be loose. Arrangements are being made to

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transfer the stator to Spokane, Washington for inspection repairs by the G.E. service shop, and a spare stator will be installed.

C. Improvement Experience

Project CA-696 - Coal Car Shake-Out - The shaker was accepted with exceptions during February. Noise level tests of this facility were made on February 23 by a representative of Industrial Hygiene Operation. Findings had not been published at month end.

H Maintenance Operation

A. Mechanical Maintenance

1. The No. 4 HCR hose reel was Class A overhauled to determine the need for maintenance of all the reels. Evidence indicates that the reels are in fair condition, but they will be scheduled for overhaul during 1959.
2. KAPL-120 modification work included installation of the instrument piping, and completion of the fuel element discharge mock-up run to the pool. Some difficulty was experienced in installing the fuel element in the pile tube due to distortion of the tube resulting from welding a spool-piece on the tube.

B. Electrical Maintenance

1. An improved 80-light annunciator was installed in H Reactor Control Room to replace the 36-light annunciator. The new annunciator has 33 spare lights for future installations.

C. Instrument Maintenance

1. Twenty-three 10-90 Panellit gages were installed during the month. Bids have been requested for repair and conversion of 300 replacement gages to a 10-90 range.
2. The Flexowriter required replacement of a potentiometer and five relays, and the digi-coder required adjustment for several days due to fluctuation of the control room air temperature.
3. KAPL-120 instruments were serviced and calibrated preparatory to operation.

D. Maintenance Engineering

1. Central Viewer Alarm - Successful functional checks were performed on the low level alarm system to insure fail-safe operation when the water supply valve is positioned either to the tank or to the direct-fill position.
2. KAPL-120 Motor-Generator Revision - The KAPL-120 motor generator set circuitry is being revised to make BPA the normal source of power for the KAPL pumps. The motor-generator set will normally run full speed unloaded, and in the event of a BPA power failure, will automatically

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pick up the load.

3. Overhead Supported Charging Machines - The design for a proposed air-powered overhead support for the charging machine was completed, and bids have been requested.

E. Property Management

Evaluation of the results of the informal inventory of movable property and in-service spare property, made during January, disclosed that all items were accounted for.

Central Maintenance Operation

A. Engineering

Performed studies relative to transistor installations, diode testing equipment, printed circuitry installation and repair, and repair of magnetic devices. Developed devices to improve drilling techniques on Project CG-817. Investigated the use of insulated solderless connectors. Provided consultation on the problem of machining a 35 foot section of a zirconium shape for KAPL. Suggested design changes in monorail work at Building 1706-KE to conserve outage time and burnout. Designed an improved ball valve leak tester.

B. Hot Shop

Tool work for tube removal programs included: repaired 66 splitters, re-zinc'd 104 splitter blades, repaired 10 splitter starters, 18 broaches, six vanstoning tools, and other miscellaneous tools. Continued reworking VSR's for H Reactor and spare parts. Revised 120 front face nozzles to be used for the rear face. Reclaimed 200 flange bolts and 50 jack bolts. Repaired sabre guns and air hammers for Blue Tool Rooms.

C. Electronic Shop

The overflow work from Building 1717-H was moved into newly acquired space in 1716-H Building. Completed thermohm lead bundle fabrication for Project CG-666 at C-Reactor. Started fabrication of thermocouple stringers for K. Started routine maintenance of the IPD Fire Alarms systems. Performed work in connection with making Visicorder readings and pressure checks on down-comers. Other miscellaneous work included: repairs to analog computers, oscilloscope, installation of portable TV, and monthly scale inspection.

D. Machine Shop

Modified zircoloy fuel element carrier and assembly for KAPL, and a tube test section for FEO. Metalized five pump shafts for 100-F Area, a process pump for 100-D Area, and a fan shaft for 100-D Area. Fabricated drilling fixtures for bellows repair at 100 B and F Areas.

E. Fabrication Shop

Fabricated equipment for the hot graphite facility at 100-K Area, slug pans for D elevator at C Reactor, a guillotine for 100-B Area, and poison spline

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equipment for KE Reactor.

F. Paint Shop

1. The regularly scheduled period of painting was completed in 100-H Area, the period scheduled for 100-D Area was started and completed, and the period scheduled for 100-K Area was started.

G. Planning and Scheduling.

Long range plans and schedules were reviewed for thermocouple replacement at KE Reactor as well as installation work for Projects CG-706, CG-817 and MJA-8.

H. Special Services

Projects active this month were: CG-666, CG-706, CG-707, CG-817 and MJA-8. Initial work was started on Projects CG-817 and MJA-8.

Manager
H Reactor Operation

RTJessen:HCS:met

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KE-KW REACTOR OPERATION
RECORD REPORT
FEBRUARY, 1959

I. ORGANIZATION AND FUNCTIONS

There were no changes of assigned responsibilities during the month.

II. PERSONNEL

A. Force Summary

	<u>January 31</u>			<u>February 28</u>			<u>Net Change</u> <u>of</u> <u>Total</u>
	<u>E</u>	<u>NE</u>	<u>Total</u>	<u>E</u>	<u>NE</u>	<u>Total</u>	
General	4	2	6	3	2	5	- 1
KE Processing Oper.	16	41	57	16	41	57	0
KW Processing Oper.	16	40	56	16	40	56	0
Power Oper.	13	72	85	13	72	85	0
Maintenance Oper.	23	123	146	23	123	146	0
Supp. Crews Oper.	10	56	66	9	56	65	- 1
TOTALS	82	334	416	80	334	414	- 2

B. Movement of People

The following changes were effective February 1, 1959.

E. J. Filip, Manager of D Processing Operation, was transferred to KW Processing Operation in the same capacity, to replace J. H. M. Miller, who was transferred to HLO as Technical Specialist.

S. L. Nelson, Manager of F Processing Operation, was transferred to KE Processing Operation in the same capacity, to replace J. T. Baker, who was transferred to D-DR Reactor Operation as Manager, D Processing Operation.

V. L. Wallace and C. L. Owen, Specialists, Reactor Operations, H Processing Operation, assumed the duties of Supervisor, 100 Operations II, Supplemental Crews Operation.

H. A. Yount and W. J. Tatum, Supervisors, 100 Operations II, Supplemental Crews Operation, assumed the duties of Specialists, Reactor Operations, H Processing Operation.

R. J. Bursey, Specialist, Manufacturing Administration, was reassigned as Manager, Supplemental Crews Operation effective February 16, 1959, to replace J. W. Baker, who was transferred to B-C Reactor Operation as Manager, B Processing Operation.

R. K. Browning, Supervisor, 100 Operations, Supplemental Crews Operation, terminated effective February 13, 1959.

Changes for the month included 6 transfers in, 7 transfers out and one termination.

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III. PERSONNEL ACTIVITIES

Third part inspector K. A. Jones, of Travelers Insurance Company, inspected Number 1 boiler in 165-KE and Number 2 boiler in 165-KW.

IV. SAFETY AND SECURITY

Eleven medical treatment injuries were experienced for a frequency rate of 1.57.

Members of the "D" Shift K Plant Safety Council completed their duty assignment with the February meeting. New Council members from "A" Shift were selected. The safety program developed for emphasis during the month in carrying out the 1959 theme "As ye sow, so shall ye reap", was emphasizing systematic reporting and reviewing of unsafe practices and conditions.

No security violations were incurred.

V. NON-ROUTINE REPORTS

None.

VI. INVENTIONS AND DISCOVERIES

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

VII. FUNCTIONAL ACTIVITIES

GENERAL

A. Administrative

Suggestion Plan statistics for the month were as follows:

Suggestions at start of month	86
Received for evaluation	17
Replies submitted	27
On hand at end of month	76

Data was compiled and submitted to T. W. Hauff regarding the individual assignments of Processing Utility Operators for the periods prior to their qualification for the Pile Operator job knowledge tests.

Arrangements were made with R. W. Menard, IPD Benefit Plans Specialist, to discuss pre-retirement employee counselling activities to determine problems involved in assuming these activities within the Reactor Operation. Seven exempt personnel attended this meeting.

Assistance was given to Manager, Supplemental Crews Operation in re-assignment of 33 Operators within IPD Processing Operations.

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B. Personnel Development Activities

The film "Power Reactors - USA" was shown to nine groups of Plant personnel. One hundred and ten people viewed the film which describes the entire panorama of the U. S. Power Reactor Program.

Attendance at IPD Training Courses was as follows:

Principles & Methods of Supervision & Leadership:	E. N. Miner E. Weasner J. K. Grady
Reactor Processing Fundamentals-I Engineering:	G. W. Wells

C. Cost

To aid the Financial Operation in compiling the IPD FY 1960 budget and to obtain trend data for FY 1961, the following information was submitted to R. D. Hastings.

Estimated overtime by Customer and an assigned basis.
Estimated personnel requirements
Estimated essential material usage (Processing and Power)

A review was made of Equipment needs. Reason sheets were prepared and submitted to B. Schauss on nine new items for FY 1960 and 1961. Two reason sheets were up-dated.

Planned Maintenance jobs were reviewed and budget reason sheets were submitted on five jobs. Two others were up-dated from previous years.

At the monthly cost meeting, maintenance cost history and projected maintenance costs were discussed. Changes in the Operating Report format were reviewed.

An appropriation request was processed for the procurement and installation of two hoists as part of the Materials handling systems in the 105 Buildings.

D. Landlord Activities

Arrangements were made to relocate the mail room facilities to a portion of the space presently assigned to the Exposure Evaluation and Record Operation in the 1701 Building.

A routine work order was written to Central Maintenance Operation to provide for maintenance of the Gamewell Fire Alarm System.

The Landlord representative attended a meeting conducted by representatives of IPD Project Engineering to review administrative and general type area requirements that will apply during construction of the additional 1706 KE-KER facilities.

Five excavation permits were processed.

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KE PROCESSING OPERATION

A. Production

Input production was 131.2 per cent of the forecast and was a new high monthly production total for a K reactor. The planned power level increases initiated in January were continued.

B. Operating Experience

1. Operating Continuity

Reactor outages totaled 51.0 hours for the month.

<u>Day</u>	<u>Hours</u>	<u>Remarks</u>
4	50.0	Ruptured slug in tube 4379. Following removal, outage time was used for metal processing.
6	0.5	Scram during start-up while adjusting flow on KER Loop 4.
6	0.3	Scram during start-up due to oscillation of the gage of test hole 3674.
28	0.2	Ruptured slug in tube 2470. A second rupture was found in tube 5148. The outage continued through month end.

2. Equipment Experience

- a. Instruments and Circuitry - An attempt to remove graphite thermocouple stringer Number 1 from the unit revealed that the stringer was stuck, bringing the total of stuck stringers to three. All other stringers remained in service with thermocouples functioning satisfactorily.

The Component Testing Operation completed an inboard inspection of all panellit gages on row 23. Five gages required replacement. Two other gages were binding on adjacent gages, and two responded sluggishly to pressure change. Corrections were made to these gages. Five restricted panellit sensing lines were cleared following a response test. Oil was added to 22 gage lines to dampen oscillation.

The panellit gage of test hole 3865 surged to the high trip point and scrambled the reactor during the February 6 start-up. The gage was replaced with one having a range of 10-90 pounds in accordance with a revised production test authorization, IP-158-A. A surge suppressor was added to the sensing line to reduce the possibility of other trips.

- b. Rupture Experience - The ruptured slug from tube 4379 that occurred on February 4, was the 8th piece from the downstream end of the charge. The hole in the slug was almost closed due to distorsion of the can. The position of the I&E rupture in tube 2470 was

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approximately two or three slugs up-stream from the mixer slug. The rupture in tube 5148 was in a mixer column with the mixer slug 17th from the rear. The remaining ten charges having similarly placed mixer slugs were scheduled for discharge.

C. Improvement Experience

1. Production and Process Tests

- a. PT-IP-21-D, Effect of Pile Operation on Charge of Graphite - One sample of graphite was removed from test hole 2-B. A new sample was charged on February 5.
- b. PT-IP-25-A, Graphite Burnout Monitoring Program - Ten graphite samples were removed from channel 3066 and three samples were charged on February 5.
- c. PT-IP-178-A, I&E Fuel Element Development and Corrosion Monitoring - KE-KW Reactors - Three tubes of the PT were discharged, the tubes probo-logged, and recharged with PT 178 material (tubes 1863, 2275, and 2566).

D. Radiation Experience

1. Radiation Occurrences

One Lapse of Radiation Control was experienced involving a contaminated particle found on the floor of a pickup truck. No significant personnel exposure was believed to have occurred. Contaminated water, up to 6000 c/m spraying on a Maintenance employee when he opened a plug on a pump, resulted in a Lapse of Radiation Control in 1706 KE.

2. External Exposure Control

The maximum dose rate measured on the rear pigtail of the rupture tube was 150 r/hr at one inch. The average dose rate to personnel for discharge operations and miscellaneous work on the rear face was 125 mr/hr. The maximum dose rate on graphite samples discharged from test hole 3066 was 9 rads/hr at surface including 1 r/hr at two inches.

3. Contamination Control

Highly contaminated material was brought into the 183-KE laboratory through a misunderstanding of the laboratory control procedures. The resulting contamination spread was confined to the laboratory which is used by the Coolant Systems Development Operation, HLO. The occurrence was formally investigated by the Radiation Protection Operation, HLO, and reported in document Number 59-0-9.

Contamination in the form of particles was found on the ground outside the 105-KE Building after Organic Loop Number 2 was moved to the burial ground. Maximum reading on the particles was 50,000 c/m. The affected area was decontaminated and returned to normal status.

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E. Events Influencing Costs

A record low unit cost was achieved for the month.

KW PROCESSING OPERATION

A. Production

Input production was 121.9 per cent of forecast. Maximum power level was limited by the planned power increase program begun in January. Heat cycling experienced during the middle of the month caused by reactivity gains necessitated reduction of power levels until the outage on February 24.

B. Operating Experience

1. Operating Continuity

Reactor outages totaled 50.9 hours. Operating continuity was affected by the following events:

<u>Day</u>	<u>Hours</u>	<u>Remarks</u>
24	44.8	Scheduled outage for metal processing.
25	1.2	Reactor scrammed by RTD failure in tube 3348.
25	1.2	Panel trip on tube 4478 due to high water pressures during start-up.
26	3.7	Scheduled poison outage.

2. Equipment Experience

- a. Instruments and Circuitry - Twenty-six of the 40 inoperative resistance temperature detector circuits that existed were returned to service during the scheduled outage. An RTD trip on tube 3348 was experienced during start-up. Since this tube had been charged during the outage, RTD repair was accomplished before start-up could be made. A ground in the system was found and corrected.
- b. Reactor Control - Long term reactivity gains up to seven inhours per day were experienced while gas atmosphere was essentially 100 per cent helium. A heat cycling problem developed as a result of the continued gain in poison effect. The initial attempts to control the cycle by use of poison splines while attempting to revise the control rod pattern were not effective. Following a conference with representatives of Operational Physics, a decision was made to control HCR movement by power level, by raising power level to gain inhours and reducing power level inhours held in HCR's. The method was successful and the cycling was halted.
- c. Graphite Thermocouple Stringers - Graphite stringer RS-1 was replaced during the scheduled outage. Five defective stringers remain in the reactor.

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C. Improvement Experience

1. Production and Process Tests

- a. PT-IP-128-CE, Supplement B, "Poison Spline Flexible Control Tests at 105-K" - Twenty splines were used for improved start-up control during the month resulting in a significant production gain. Twenty-five additional spline cap assemblies were installed during the scheduled outage for additional reactivity control.
- b. PT-IP-178-A, "I&E Fuel Element Development and Corrosion Monitoring KE & KW" and Supplement A - Three KIII metal loadings with thermocouple probes and seven normal KIII loadings were made under these tests during the February outage.

D. Radiation Experience

1. Radiation Occurrences

There were no Lapses of Radiation Control.

2. External Radiation Control

Routine discharge operations were conducted at dose rates averaging 100 mr/hr at the center of the elevator and 20 mr/hr at the ends of the elevator. These readings correspond closely to those encountered prior to rear face piping decontamination. The maximum personnel dose rate during graphite stringer removal was 700 mr/hr. An inspection was made of the B retention basin at an average dose rate to personnel of 30 mr/hr. Poison splines were withdrawn at personnel dose rates of 500 mr/hr. Removal of the gunbarrel from the RS-1 facility was accomplished at a maximum dose rate of 700 mr/hr to personnel. Samples containing thermocouple wire were removed from the 4-B test facility at maximum personnel dose rate of 500 mr/hr. The dose rate to insert the shielding plug at the conclusion of the job was 2.0 r/hr.

E. Events Influencing Costs

A record low unit cost was achieved for the month.

KE-KW POWER OPERATION

A. Operating Experience

1. Use of the K Area generators for peak control purposes was required for 550 hours during the month. Bonneville Power Authority interruptible demand was limited to approximately 25 megawatts. Control efforts reached a maximum of 6.5 megawatts on February 10.

B. Equipment Experience

1. Number 4 Liquid Rh.ostat - 190-KW

During routine start-up preparations, the electrolyte circulating pump on Number 4 Rheostat at 190-KW failed to operate. Investigation

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revealed a broken lead wire at the motor connection. Repairs were made and the pump was returned to service without delaying the reactor start-up.

2. IT4 Transformer - 165-KE

On February 5, the IT4 transformer supplying "D" bus, failed. Inspection of the transformer revealed a failure of the primary coil on "C" phase. Switching arrangements permit the C-D bus-tie to supply D bus until the transformer is returned to service. The failure occurred during a reactor outage and all switching adjustments were completed prior to start-up.

C. Improvement Experience

1. CG-715, Automatic Synchronizers

Installation of the automatic synchronizing equipment at 165-KE was completed during the outage of February 5. The system was placed into service.

2. CG-775, K Water Plant Expansion

Fabrication of the piping required for testing of the prototype pump was begun. This work is being carried out in the 165-KE pipe gallery by minor construction forces.

3. Gravity Acid Feed System

All work on the new gravity acid feed system at 183-KE not requiring outage time was completed. Change-over to the new system will be made during the next KE Reactor outage in March.

KE-KW MAINTENANCE OPERATION

A. Equipment Experience

1. Instruments

- a. Panellit System - Range changes were made on 798 gages. Twenty-six leaking toggle valves were repaired or replaced in 105-KE. New "O" rings were ordered as replacements for the present ones which are becoming brittle.
- b. Temperature Monitor System - Six resistance elements and 11 sensitrol relays were replaced in 105-KW and repairs were made to 28 connectors and 41 controller boxes. In 105-KE six sensitrol relays were replaced and six controller boxes were repaired.
- c. Gamma Monitor System - Modifications were made in the 105-KW system to allow recording of front-to-rear test hole water activity on point "60" of the right gamma recorder.

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2. Electrical

- a. Relay Testing - 105-KW - The current program of relay testing was completed.
- b. Safety Circuit to Ball 3X Circuit Delay Interlocks - 105-KW - Electrical jumpers were installed in the 3X ball hopper trip circuit in accordance with K Maintenance Engineering Operation recommendations. The change was made to eliminate the possibility of a 3X ball trip caused by inadvertent operation of bypass switches or from relay failures.

3. Mechanical

- a. Vertical Safety Rods - Six additional gas seals in special clamps (cans) were installed in 105-KW. Four regular seals were installed in 105-KE.
- b. Extended Outage - 105-KE - Work was initiated on the Turco piping installation for the forthcoming internal decontamination. Work proceeded on the fabrication of tools required for mattress plates, bellows installation and venturi reaming.

B. Engineering and Planning and Scheduling

1. Instrument Engineering

All remaining harness assemblies for 105-KE were received. New screw-on plastic caps and plugs were placed on order. These were designed to protect the resistance temperature detectors and lead wire connectors during installation.

The Materials Development Operation has developed a method of removing excess rubber from molded connectors to insure a more positive electrical connection. Tests of twenty-five improved connectors were satisfactory. A request was issued to Central Maintenance Operation to perform this work on all connectors to be installed in 105-KE during the extended outage.

2. Electrical Engineering

- a. High Lift Pumps - Inspections of the motor brushes revealed additional pigtail-to-brush failures. These brushes were replaced with new brushes. Fifty samples were sent to General Electric Carbon Products Department to further studies for an improved design. Arrangements were made with the vendor to supply two lots of test brushes. One hundred will be of the same carbon and treatment as the present T943 brushes but with a double pigtail shunt. The other hundred will have a single pigtail shunt and will be silver treated.
- b. 5000 KVA Generators - A detailed class "E" inspection procedure and test data sheets were developed for use with FM system overhauls of the generators.

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3. Mechanical Engineering

- a. Retention Basins - 107 KE-KW - The "B" basin chutes were inspected to evaluate the effectiveness of repairs made in 1957 by Construction Operation. No indications of new damage to the chutes were found.

4. Planning and Scheduling

Class "A" overhauls were completed on 260 items of equipment and class "B" overhauls on 88 items. The class "B" overhauls included the Number 1 generator in 165-KW and the high lift pump motors in the 190 Buildings.

SUPPLEMENTAL CREWS OPERATION

A. Events Influencing Costs

1. Overtime

Non-exempt overtime worked by Supplemental Crews totaled 492 hours. Eight hours of exempt overtime was worked.

R. S. Bell
Manager
KE-KW REACTOR OPERATION

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PRODUCTION OPERATION

FEBRUARY, 1959

I. ORGANIZATION AND FUNCTIONS

No change.

II. PERSONNEL

A. Force Report

	<u>January 31</u>			<u>February 28</u>			<u>Net Change</u>
	<u>Ex.</u>	<u>N.E.</u>	<u>Total</u>	<u>Ex.</u>	<u>N.E.</u>	<u>Total</u>	
General	2	1	3	2	1	3	0
Prod'n Reports & Statistics	1	2	3	1	2	3	0
Prod'n Forecast'g & Sched'g	5	4	9	5	4	9	0
Prod'n Computing	3	3	6	3	3	6	0
Essential Materials	1	1	2	1	1	2	0
Total	12	11	23	12	11	23	0

III. PERSONNEL ACTIVITIES

Nothing to report.

IV. SAFETY AND SECURITY

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

V. NON-ROUTINE REPORTS

<u>Doc. No.</u>	<u>Title</u>	<u>Author</u>	<u>Date</u>	<u>Class.</u>
HW-59083	Production Forecast Assumptions IPD, February 1, 1959 through June 30, 1964.	T. Prudich	2/2/59	Secret

VI. INVENTIONS AND DISCOVERIES

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

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VII. FUNCTIONAL ACTIVITIES

A. Production Forecasting, Scheduling and Analysis

1. Production Scheduling

a. Discharge Concentrations

The discharge goal plan was not changed during February. An expected reduction of the enriched I & E goal at C and the K Reactors was not made because of a Research and Engineering recommendation (HW-58740) which indicated that the existing goal was optimum and because of the continued good performance of this material. The goal plan recommended in the document referred to above covers C and the K Reactors and for the present conditions of flow, power, and inlet water temperature, closely approximates the existing goal plan except for regular I & E material at C Reactor. In this case action has been deferred because discharge exposures well in excess of those recommended have not resulted in slug ruptures to date.

Very little material was discharged below the goals assigned under the goal exposure plan as shown by the following table:

Below Goal Discharging - February 1959

<u>Reactor</u>	<u>Tons Disch.</u>	<u>Tons Excess Usage</u>	<u>Mat'l Type</u>	<u>Reason</u>
C	1.3	0.5	Regular	Material discharged from OCD zone under PT IP 162.
D	1.6	0.5	Regular	Tubes were over-powered during a hot start-up and were discharged as a precautionary measure.
H	1.6	0.5	Enriched	Interim goal reduction to forestall ruptures while this goal is being reviewed.
KE	<u>2.4</u>	<u>0.8</u>	Regular	Discharge of rupture prone lot SK-036-D
	5.3	1.8	Totals for Regular Material	
	1.6	0.5	Totals for Enriched Material	

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Comparison of February Discharge Exposures (MWD/Ton)

<u>Month</u>	<u>Regular U</u>		<u>Enriched U</u>	
	<u>Solid</u>	<u>I & E</u>	<u>Solid</u>	<u>I & E</u>
December	583	733	735	773
January	670	713	840	713
February	706	782	1176*	755

* Less than one ton discharged.

b. Process Tube Replacement

Tube replacement work in February was very light with C Reactor replacing seven tubes and H Reactor 28.

c. Off-Plant Shipments

One cask of isotope production was shipped to ORNL. Eleven casks of irradiated bismuth were shipped to Mound Laboratory.

2. Operations Analysis

Work continued on up-dating process tube replacement forecasts.

The study to determine procurement schedule, installation location and types of zirconium tubes was continued during the month.

Direction and accumulation of material for the Five-Year Program Document was begun.

B. Production Computing

1. Routine

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

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

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2. Modified Tube Goaling Computation

This month an improved method of goaling production material for discharge was adopted. Slug damage is proportional to the power at which the slug is being irradiated. Hence, under the variable goal discharge plan, tube goals decrease sharply with increasing tube power. Since the reactor power distribution fluctuates from time-to-time during the exposure life of a column, the goal likewise fluctuates. In order to take into account the total amount of slug damage incurred during varying levels of tube power, the fraction of the goal exposure incurred during each successive exposure is computed. The sum of these fractions is accumulated as the Fraction of Goal Realization. When the sum reaches unity, the column is scheduled for discharge.

3. Tube Corrosion Forecast

Data processing work continued on the forthcoming IPD tube replacement forecast being directed by the Specialist, Operation Analysis. Machine work is 80 percent complete at month end.

C. Production Reports and Statistics

1. Daily Reporting

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

2. Monthly Reporting

The combined report of Production and Reactor Operations for January was assembled and issued.

The January production summary was prepared for management.

Special monthly report information was assembled for personnel of the AEC-HOO (Process Engineering and Manufacturing Division) summarizing plant operation and related statistics for January.

The December report of Production Losses Due to Special Irradiations was issued.

3. Production Statistics

Production statistics work performed during February included the following:

- 1.) A chart book showing reactor outage time, ruptures and scrams was maintained for department management.
- 2.) The Product Cost and Budget Operation was furnished production data, operating efficiencies, outage hours and tube replacement information.

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- 3.) The Radiation Protection and Analytical Laboratories Operations, HLO, were given weekly reports showing process water flows and related reactor data.
- 4.) The Plant and Industrial Engineering, Component Testing and Supplemental Crews Operations were supplied information each morning showing which reactors were operating.
- 5.) The Processing Engineering Operation, Fuels Preparation Department, was given power level, water flow and tube replacement data.
- 6.) Process tube leak data since startup at C Reactor was given to the Equipment Development Operation.
- 7.) Reactor outage data for the K's during CY 1957 and 1958 was developed for K Maintenance Operation.
- 8.) Developed reactor power level data for personnel of the AEC-HOO (Process Engineering and Manufacturing Division).

D. Essential Materials

Rail and truck shipments received in February were as follows:

Carload shipments for IPD	170
Carload shipments of other Depts.	263
Truck shipments for IPD	146
	<hr/>
Total shipments received	579

Helium consumption during the month of February for all reactors was as follows:

100-B	-	214,600 cu. ft.
100-C	-	265,260 cu. ft.
100-D	-	240,074 cu. ft.
100-DR	-	153,000 cu. ft.
100-F	-	226,814 cu. ft.
100-H	-	98,097 cu. ft.
100-KE	-	586,948 cu. ft.
100-KW	-	199,012 cu. ft.

Total 1,983,805 cu. ft.

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

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1. The liquid carbon dioxide deliveries were so arranged to allow the vendor to withdraw his truck from this service for a forty-eight hour period. This was done to give the vendor an opportunity to deliver a load of this material to an air base in Great Falls, Montana.
2. A strike occurred without warning the evening of February 20 on the Union Pacific Railroad affecting the states of Washington and Oregon. Although the tie-up lasted only sixteen hours and only slight delay was encountered in the delivery of materials, the Commission was asked to prepare alternate routings for Helium cars to take effect immediately in the event of a recurrence or similar situation in the future.
3. A test sample consisting of 300 lbs. of hydrated alumina was obtained from the Reynolds Aluminum Co. to compare the material with that received from Kaiser. The Reynolds material contains a smaller percentage of fines and it was believed that troubles in the reaction vessel might be eliminated with the use of coarser material.
4. The most recent memorandum from the Bureau of Mines dated February 25 states that the Helium supply for March is expected to be the same as it has been for the past few months.
5. Continued to investigate the progress being made by the Mouat Industries in getting their Columbus, Montana Sodium Dichromate plant into production.

E. Miscellaneous Activities

Central assistance with administration of the recently formalized Pile Operator selection procedure was given the Employee Relations Operation and the Reactor Operations. This involved principally improvements in the design of the written job knowledge tests, and in the procedures for grading completed test papers.

Security classification matters continued to be handled for the department. New guidance from the AEC-HOO and from HLO was given appropriate dissemination within IPD. Special attention was accorded the classification problem inherent in the compilation of several independently-prepared documents into a single combined report.

At the request of the Employee Relations Operation, an explanation of AEC regulations relating to operator licensing at licensed reactor sites was prepared in response to an inquiry which arose during Round Table discussions in one of the reactor areas.

The department's OPG's and Advices covering production-related policies, responsibility assignments, and practices were reviewed and discussed with the components primarily involved, as part of a program to assure

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that these basic instructions and guides are current and adequate. Needed revisions were initiated, and several new issues were given preliminary consideration.

Manager
Production Operation

CA Priode/DLD/bam

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MONTH		REACTOR OPERATIONS STATISTICS - PROCESSING															
February, 1959																	
INPUT PROD.-Pu (% OF FORECAST)		121.0		101.8		119.2		147.0		148.7		112.0		131.2		121.9	
TIME OPER. EFF. (% OVERALL)		87.7		75.5		92.0		99.9		100.0		83.5		92.4		92.4	
NO. OF REACTOR OUTAGES & HOURS																	
SCHEDULED		NO.	HRS.	NO.	HRS.	NO.	HRS.	NO.	HRS.	NO.	HRS.	NO.	HRS.	NO.	HRS.	NO.	HRS.
UNSCHEDULED - SCRAMS		1	20.2	0	0	3	3.8	1	0.3	0	0	1	1.1	2	0.8	2	2.4
- OTHER		0	17.9	1	77.0	0	15.1	0	0	0	0	2	25.7	2	5.9	0	1.8
TOTAL		1	82.5	2	164.7	3	53.7	1	0.3	0	0	3	110.7	4	51.0	3	50.9
BREAKD'N OF REACTOR OTGE HRS.																TOTAL HRS. TIME	
PLANNED																	
CHARGE-DISCHARGE		32.4		28.0		25.5		0		0		38.5		36.0		37.4	
TUBE REPLACEMENT		0		0		3.9		0		0		22.3		0		0	
PROJECT WORK		0		0		0.8		0		0		0		0		0	
PRODUCTION TEST		10.0		5.1		0		0		0		0		6.3		2.3	
MAINTENANCE		2.0		54.6		4.6		0		0		23.1		0.5		7.0	
MISCELLANEOUS		0		0		0		0		0		0		1.5		0	
SUB - TOTAL		44.4		87.7		34.8		0		0		83.9		44.3		46.7	
UNPLANNED																	
CHARGE - DISCHARGE		(1)20.2		0		(4)15.2		0		0		7.7		0		1.0	
PRODUCTION TEST		0		29.3		0		0		0		0		0.5		0	
RUPTURE REMOVAL		0		(2)23.0		0		0		0		14.0		4.8		0	
WATER LEAK		17.9		22.3		0		0		0		0		0		0	
MAINTENANCE		0		2.4		3.2		0		0		5.1		1.1		0.8	
INSTRUMENTATION		0		0		0.5		0		0		0		0		1.2	
PANELLIT		0		0		0		0.3		0		0		0.3		0	
MISCELLANEOUS		0		0		0		0		0		0		0		1.2	
SUB - TOTAL		38.1		77.0		18.9		0.3		0		26.8		6.7		4.2	
TOTAL		82.5		164.7		53.7		0.3		0		110.7		51.0		50.9	
NO.SLUG RUPT. (ALL TYPES)		0		0		0		0		0		2		3		0	
NO.NEW TUBES INSTALLED		0		7		0		0		0		28		0		0	
TYPE OF WATER LEAK - TUBE		0		0		0		0		0		1		0		0	
VAN STONE		0		(3)1		0		0		0		0		0		0	

- (1) Broken front face ball valve nozzle.
 (2) Replacement of problem tubes that were previous ruptures.
 (3) Also found and corrected a rear gasket leak.
 (4) Removal of a broken spline.

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

MONTH
February 1959

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MONTH February, 1959	REACTOR OPERATIONS STATISTICS - POWER										SHEET 1	
	100-B	100-C	100-D	100-DR	100-F	100-H	100-KE	100-KW	TOTAL			
RIVER WATER (BLDG. 181)												
TO RESERVOIR (BLDG. 182)	3045		15835		3173	2591			24644			
TO FILTER PLANT (BLDG. 183)	71200		86389		82035	72700	165100	166500	643924			
TO FILTER PLANT (CSDR)	90041		74642						164683			
TO R & E (KER) & F.E.O.			203				905		1108			
TOTAL	164286		177069		85208	75291	166005	166500	834359			
TOTAL	6624.0		7139.4		3435.6	3035.7	66933	6713.3	33641.3			
RESERVOIR WATER (BLDG. 182)												
TO POWER HOUSE (BLDG. 184)	45		72		27	25			169			
TO COND. SYSTEM (BLDG. 190)	3000		1620		3146	2566			10332			
TO COND. SYSTEM (190DR & 183F)			2700		0				2700			
TO EXPORT SYSTEM	0		11443		0	0			11443			
TOTAL	122.8		638.5		127.9	104.5			993.7			
FILTER WATER (BLDG. 183)												
TO POWER HOUSE (BLDG. 184)	181		201		114	138			634			
TO PROCESS (BLDG. 190)	72439	79689	75769	79696	79312	69540	162075	163516	782056			
TO 108	2500	4000	1389		1172	1300			10361			
TO 108DR			1389						1389			
TO FILTER PLANT (BLDG. 183DR & 183F)			5839						(11191)			
TO F & S SYSTEM	162	5352	273						720			
TO R & E (KER) & F.E.O.			153		131	104	7	50	160			
BACKWASH	1270	1000	1556	785	1306	1618	3018	2934	13287			
TOTAL	3086.6	3630.5	3483.2	3245.0	3307.7	2931.3	66568	6713.3	33054.4			
PROCESS WATER (BLDG. 190)												
TO REACTOR	72039	79289	75389	79296	78912	69040	161100	159500	774565			
TO REACTOR	78500	94500	80300	79700	80000	80000	171700	171000	835700			
POWER HOUSE (K AREA)							30	15	45			
108 (KE - KW)							376	3601	3977			
TO R & E (KER)							169		169			
BUILDING USAGE	400	400	400	400	400	500	400	400	3300			
TOTAL	2920.7	3213.1	3055.8	3213.3	3197.9	2803.9	6534.9	6593.0	31532.6			
RIVER DATA												
ELEVATION (MSL. FT.)	390.2		381.9		368.3	374.0			384.0			
	388.6		379.0		366.0	372.6			381.4			
	389.4		380.5		367.6	373.2			383.5			
TEMPERATURE	39.0		40.0		41.9	40.5			38.5			

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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											
MM GALS	-		-		-	-			-		
MM GALS	2870.8	3630.5	3483.2	3009.6	3307.7	2931.3	6656.8	6713.3	32603.2		
CHEMICAL CONSUMPTION											
LBS.	-		-		-	-			-		
LBS	8799	13627	12690	7860	13707	13350	26900	28500	125433		
AVG PPM	0.4	0.4	0.4	0.3	0.5	0.5	0.5	0.5	0.5		
LBS	27905	-	-	-	-	-			27905		
	*	-	-	-	-	-			-		
ALUM											
LBS	21909	117883	167380	129970	167164	115400	221800	277300	1218806		
AVG PPM	* 5.6	3.9	5.8	5.2	6.1	4.7	4.0	5.0	4.8		
SEPARAN											
LBS	100	50	393	155	400	95	550	550	2293		
AVG PPM	.004	.002	.013	.006	.015	.004	.010	.010	.008		
SULPHURIC ACID											
LBS	219112	278869	227362	195137	217870	200139	453600	388600	2180689		
AVG PPM	9.2	9.2	7.8	7.8	7.9	8.2	8.2	6.9	8.0		
LBS	43500	47800	45850	48200	47169	40535	98800	96600	468454		
PURGE MATERIAL CONSUMPTION											
SOLIDS	0	0	0	0	0	0	0	0	0		

* Avg PPM of Alum and Alumina Combined.

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REACTOR OPERATIONS STATISTICS — POWER										SHEET 3	
MONTH	100-B	100-C	100-D	100-DR	100-F	100-H	100-KE	100-KW			
ANALYTICAL DATA											
RAW WATER											
PH	7.90	7.80	8.20	8.20	8.00	8.00	7.66	7.83			
TURBIDITY	18.0	16.0	22.0	24.0	22.9	23.0	20.0	21.5			
FINISHED WATER											
PH	7.00	7.00	7.09	7.06	7.00	7.06	7.08	7.08			
TURBIDITY	.004	.006	.005	.005	.006	.007	.007	.006			
CL ₂ RESIDUAL	.05	.05	TRACE	TRACE	.05	.05	.05	.05			
DICHROMATE	1.80	1.79	1.80	1.80	1.77	1.85	1.80	1.80			
STEAM DATA											
GENERATED (MAX)	117000	135000	64000	66000	382000	80000	74000	154000			
(NOR)	92300	99000	53000	50000	300300	--	-	-			
(AVG)	92700	103674	58086	50000	305460	45330	36741	82071			
TOTAL	62273	69669	39034	34430	206106	30462	24690	55152			
TO PLANT	52401	59079	34350	29197	176027	27416	22221	49637			
COAL RECEIVED	4727	2427	1039	805	8998	-	-	-			
CONSUMED	2798	3932	2703	2378	12811	-	-	-			
IN STORAGE	36340	43777	30840	29246	140203	-	-	-			
GENSTEAM/LB.OF COAL	8.29	8.86	7.22	7.24	8.04	-	-	-			
ELECTRICAL DATA											
OIL RECEIVED								502991	0	502991	
CONSUMED								276947	222432	499379	
IN STORAGE								1352316	940422	2292738	
GENSTEAM/GAL.OF OIL								110.0	111.0	110.4	
TOTAL GENERATED KW HRS.											
							1825600	1814400	3640000		

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FACILITIES ENGINEERING OPERATION
MONTHLY RECORD REPORT

FEBRUARY, 1959

I. ORGANIZATION AND PERSONNEL

A. Responsibility

There were no changes of assigned responsibilities during the month.

B. Personnel Statistics

	<u>January 31,</u> <u>1959</u>	<u>February 28,</u> <u>1959</u>	<u>Net</u> <u>Change</u>
Employees on Permanent Roll	211	212	+1
Technical Graduates (Rotational)	3	1	-2
Technical Trainees	2	2	0

	<u>FEO</u>	<u>Technical Graduates</u> <u>Rotational</u>
Transferred into Operation	4	0
Transferred out of Operation	0	1
Payroll Removals	3	0

C. Personnel Changes

M. H. Fitch, Secretary, was placed on the roll with Process Design on February 5, 1959.

L. H. Love, Steno-typist, was placed on the roll with Expansion Operation on February 2, 1959.

V. W. West, Stenographer, was placed on the roll with Plant and Industrial Engineering on February 16, 1959.

G. A. Fox, Engineer, was placed on the roll with Plant and Industrial Engineering on February 1, 1959.

R. L. Roy was removed from the roll through retirement on February 28, 1959.

J. Shipp, Secretary, was removed from the roll due to a leave of absence on February 28, 1959.

C. H. Nord, Design Draftsman, terminated from Plant and Industrial Engineering on February 13, 1959.

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D. Personnel Development

<u>Title of Course</u>	<u>Personnel Attending</u>
Secretarial Proficiency	3
Principles and Methods of Supervision	2
Radiation Protection	7
Reactor Processing Fundamentals	7
You and Labor Law	1
Understanding Human Behavior	4

E. Safety and Security Experience

Three medical treatment injuries were reported.

No security violations were reported.

II. MONTHLY REPORT OF INVENTIONS OR DISCOVERIES

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

<u>Name</u>	<u>Title</u>
V. G. Blanchette	Improved Telemeter Recorder Control System

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III. ACHIEVEMENT

A. Process Design

1. Research and Development

a. Category I - Existing Reactor Support

Equipment required for investigation of stress conditions in 190-C and 105-C building primary coolant system piping has been received. The purpose of these tests will be to determine the effect of the rather high water velocities currently existing in the C piping. The data will be of assistance in setting up studies in support of possible future higher water flow operation in the other reactor plants, as well as at C.

As part of the task force review of the K plant emergency back-up system, preliminary engineering studies were made of a number of alternate modification schemes including, individually or in various combinations, the following items:

- (1) An additional 24" high pressure cross-tie line between 105-KE and 105-KW to operate in parallel with the existing line.
- (2) An 8" steam cross-tie line between the KE and KW boilers with piping also provided to supply an additional steam driven primary pump in each area.
- (3) An additional pump set in each 190-K building.
- (4) An additional river pump house.
- (5) A new, independent back-up facility to serve both KE and KW.
- (6) New, additional raw water reservoir to serve both KE and KW.
- (7) Portable diesel driven pump with sufficient quick assembly pipe to reach from the river to the 105 buildings.
- (8) Tie-in to 100-B, C export water line.
- (9) Replacement of one service water pump in each plant with a 30,000 gpm steam driven pump and provision of a steam cross-tie line between areas to assure continuous steam supply.

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- (10) Addition of a high tank on the high pressure cross-tie line.
- (11) High tanks at each reactor.
- (12) Revise so that emergency system is continually delivering water to the reactor.
- (13) Emergency power cross-tie between KE and KW.

In addition to current back-up requirements, the effect of future flow increases is also under consideration. Results will undoubtedly affect the scope of project CG-775, K Water Plant Expansion.

b. Category II - New Reactor Studies

Rehabilitation of the Heat Transfer Electrical Analog is essentially complete. A more accurate voltmeter has been purchased and is still to be installed but useful results can be obtained with the present equipment.

A document was issued which reviews the physics problems associated with the planned UO₂ fuel temperature coefficient experiment. Further fabrication of experimental equipment is being delayed until these problems are resolved.

Installation of major equipment for the high pressure process tube rupture test is virtually complete. Graphite is being machined by the vendor and is scheduled to be on-site by mid-March. It has been concluded that some modifications to the loop will be required to obtain critical flow data. Detailed information is being developed regarding these requirements and their effect on test schedules.

2. Design Projects

a. CG-775 - 100-K Area Water Plant Expansion

Primary emphasis continues to be placed on completing preparations for installation and testing of the prototype process pump modifications at 190-KE during the extended outage planned for April. All drawings have been completed and construction work has been initiated. Liaison reports indicate that all procured items will be on hand in time to meet the current installation schedule.

Construction of the 190-K primary pump suction well model at Oregon State College has been completed and testing is in progress.

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The contract for the river pump house model studies at Washington State College was modified to include effects of a large sand bar in the forebay. Construction of the model has been completed and testing is in progress.

b. CG-791 - Reactor Confinement

Modification to the directive for this project to cover total project design and testing as well as installation of rear face fog spray systems (Phase I) in all existing reactors was received this month. In acknowledging receipt of the directive, it was noted that no firm commitments could be made at this time regarding completion dates for later phases of the project or regarding feasibility of installing halogen removal facilities by the time beneficial use of the filter building is achieved.

Thirty detail design drawings were reviewed during the month with comments forwarded to CEO for appropriate action. However, to date no drawings have been received for approval, even on Phase I. Over-all completion of detail design is now 34 percent, which is well behind the scheduled level of 55 percent complete. Testing was completed on evaluation of alternate fog nozzle designs and required spacing. Rockwood model L-11-A nozzles proved superior in pattern diameter and spray distribution. It is planned to use these nozzles, spaced at ten foot intervals, with provisions for adding nozzles at the five foot interval points. It will be necessary to issue final drawings to the field in the very near future if the fog spray installation in 105-KE is to be accomplished during the scheduled extended outage in April. Twenty-one requisitions for fog-spray equipment were issued during the month with approximately six more remaining to complete the requirements (other than field procured items).

Test specifications were prepared for the proposed off-site halogen removal system tests. These were forwarded to the probable testing agency, MSA Research Corporation, for their review.

A visit was made to the GE ANP site at Arco during the month to discuss their iodine removal program and to witness an air decontamination test in the MTR. These tests were initiated to confirm laboratory data on silver coated fiber filters by attempting to decontaminate air flowing over a ruptured ANP fuel element while it was being irradiated.

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c. CA-816 - New Production Reactor

Three reactor plant criteria were issued for comment during the month, bringing the total to eight. Four criteria were approved by the Reactor Plant Project Representatives and three were approved by the Expansion Design Council. Two detail drawings on the Ball Safety System were issued for comment. A purchase order specification for the procurement of zirconium tubes was approved.

On the heat conversion system design, the A-E's report of February 20 shows Title II design as six percent complete. It also shows design scope as being on schedule, on the basis of scope drawings being delivered to Hanford. However, scope approval is not on schedule, since only three of the eleven scope drawings scheduled for approval by March 1 have actually been approved. Although some of this delay is due to the time taken to reach basic decisions and to process drawings, the main factor is the lack of detail or explanation on the drawings which makes it very difficult to obtain scope approval. Early in the month, the A-E was requested to furnish supporting criteria with each scope drawing. Subsequently, a policy was adopted whereby processing of flow diagrams, one line diagrams, and heat balances would be withheld until they can be accompanied by written design criteria.

Final consideration of primary loop material selection was initiated during the month. Presentation of latest information on both carbon steel and stainless steel was made to the Project Representatives. Formal processing is to be initiated without delay.

To clarify status of over-all project timing, a compilation was prepared of NPR development testing schedules including estimated dates for completion of testing in support of procurement, for freezing of design, for initiation of procurement, and for field requirements. Review of this compilation indicates that the only item on which lack of procurement funds to date has been critical is zirconium process tubes. For a consistent basis of schedule estimating, it appears that on the order of one month deferment in plant completion has resulted to date. It is also indicated that procurement of a number of major items of process equipment must be initiated during the next month. For a number of other items including graphite, nuclear instrumentation, and process data logging equipment, maximum utilization of available time is planned in order to incorporate as much development effort as possible into the reactor installation.

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3. Visitors

The following personnel from Burns and Roe, Incorporated, visited Process Design during the month to discuss over-all plant instrumentation and control as well as procurement of primary system piping:

Mr. John Gronan, Project Manager
Mr. George Lewis
Mr. Frank Steinbrucker
Mr. Henry Gitterman
Dr. S. Baron

J. Hampton Riley of Peacock Engineering visited Reactor Plant Design to discuss butterfly and diversion valve designs.

Martin Headman, Manager of Research, R. B. Bavork, Manager of Sales, and D. M. Matheney, Application Engineer for Western Gear visited Reactor Plant Design to discuss butterfly and diversion valve drive mechanisms.

Jim Keller, Sales Engineer for Air and Hydraulic Equipment Company of Portland, Oregon visited Reactor Plant Design to discuss control rod drive design and fabrication problems and to view the rod test installation.

4. Trips

N. E. Bennewitz visited Washington State College Computer Center February 25 to discuss use of their IBM-650 computer for N reactor piping thermal stress analysis with Dr. Ottis Rechard, Director.

N. F. Fifer visited Oregon State College February 25 to March 1 to assist their efforts on the 190-K primary pump suction well model test program.

H. W. Heacock visited Oregon State College on February 19 to review progress on current development test programs. He also presented a talk on the gas-cooled reactor program to the Oregon Section of the ASCE in Portland.

H. G. Johnson and G. E. Wade visited Dr. E. R. Tinney, Director of the R. L. Albrook Hydraulic Laboratory at Washington State College February 25 to discuss possible model testing of NPR primary flow loop components.

E. M. Kratz met with Burns and Roe as well as GE Turbine Department personnel in New York City on February 2 and 3 to discuss alternate turbine designs applicable to NPR conversion to different levels of electric power recovery.

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J. F. Nesbitt visited the following vendors during the month to discuss mechanical equipment applicable to NPR containment system design:

Black, Sivalls and Bryson, Incorporated
Kansas City, Missouri - February 11

Henry Pratt Company, Incorporated
Chicago, Illinois - February 11

Frangible Discs, Incorporated
Penns Grove, New Jersey - February 12

W. S. Rockwell
Fairfield, Connecticut - February 13

5. Significant Reports Issued

HW-57014 RD2 - "Ball Safety System - 105-N," J. F. Nesbitt,
February 5, 1959.

HW-57014 RD3 - "Ball Safety System - 105-N," J. F. Nesbitt,
February 10, 1959.

HW-57009 RD3 - "Graphite Moderator - 105-N," D. Marinos,
February 5, 1959.

HW-59137 - "Process Design Operation Monthly Design Test and
Development Progress Status Report," January 30,
1959.

HW-58899 RD - "CG-704 - 100-K Outfall Study - Final Report,"
D. F. Watson, January 31, 1959.

HW-58973 - "Budget Study Report FY-1961 Plant and Equipment
Budget," G. E. Wade, January 30, 1959.

HW-59074 - "Production Test IP-235-AE - Performance Test of
CG-558 190 Building Pump with Replacement Rotating
Assembly," M. H. Schack and S. S. Jones, January 31,
1959.

HW-58580 - "Existing Reactor Water Plant Study B, C, D, DR,
F and H Reactors," D. F. Watson, January 19, 1959.

HW-59016 - "Budget Study Report - FY-1961 Plant Acquisition
and Construction Budget," D. F. Watson, February 4,
1959.

HW-59017 Pt 1 - "Budget Study Report - FY-1961 Plant Acqui-
sition and Construction Budget Effluent
System Modifications to Increase Bulk Outlet
Temperatures, B, C, D, DR, F and H Reactors,"
E. R. Rudock, February 2, 1959.

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- HW-59017 Pt 2 - "Budget Study Report - FY-1961 Plant Acquisition and Construction Budget - Effluent System Modifications to Increase Bulk Outlet Temperatures, KE and KW Reactors," E. R. Rudock, February 2, 1959.
- HW-59062 - "190 Building Cone Valve By-Pass Lines," H. W. Heacock, January 30, 1959.
- HW-59124 - "Trip Report - ORNL Irradiated Uranium Burning Test Program," E. L. Etheridge, February 13, 1959.
- HW-59627 - "Project CG-775 - Representatives Meeting No. 3," H. W. Heacock, February 16, 1959.
- HW-58739 - "K Graphite Restoration Study," E. R. Rudock, February 19, 1959.
- HW-57665 1 - "Project CGI-791 - Reactor Confinement Design Criteria for Rear Face Fog Spray System (Phase I)," R. C. Walker, January 30, 1959.
- HW-59375 - "Production Test IP-241-M - Performance Test of CG-558 - 190 Bldg. Pump with Byron Jackson First Stage Impeller," M. H. Schack and S. S. Jones, February 25, 1959.
- HW-59376 - "Production Test IP-242-M - Performance Test of CG-558 - 190 Bldg. Pump with Replacement Rotating Assembly," M. H. Schack and S. S. Jones, February 25, 1959.
- HW-58590 - "Design Test Request No. 1042, Rear Face Fog Spray Nozzle Spacing," E. L. Etheridge, February 17, 1959.
- HW-59245 - "Power Generation Facilities for NPR," W. J. Dowis, H. R. Kosmata, E. M. Kratz, February 12, 1959.
- HW-59072 - "Factors Concerning 105-N Stack Temperature Measurement," R. F. Corlett, January 27, 1959.
- HW-59275 - "Pre-Test Analysis of 100-N Tube Rupture Program," R. F. Corlett, February 17, 1959.
- HW-57807 REV - "NPR Selective Containment Calculations," C. A. Pursel, February 19, 1959.
- HW-59370 - "An Analysis of the UO₂ Temperature Coefficient Experiment," F. J. Mollerus, Jr., February 24, 1959.

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- HW-59409 - "Insulation and Ventilation Requirements for NPR Process Area," D. E. Sebade, February 26, 1959.
- HW-59415 - "Resume of Carbon Steel Information Meeting," H. R. Kosmata, February 27, 1959.
- HW-57044 RD2 - "100-N Design Bases - Part II - Functional Requirements of the Primary Loop Control and Instrumentation System," D. L. Condotta, February 9, 1959.
- HW-57957 - "Heat Conversion Plant Representatives Meeting No. 10," M. H. Russ, February 6, 1959.
- HW-57958 - "Heat Conversion Plant Representatives Meeting No. 11," M. H. Russ, February 17, 1959.
- "Test Procedure - Second Performance Test of 190-DR Annex Pump No. 6 Equipped with Replacement Rotating Assembly," M. H. Schack, February 23, 1959.

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B. Equipment Development

Fifty-one uranium columns were discharged and recharged while operating at C Reactor during February using the charge-discharge-while-operating equipment. No scrams were encountered during these operations. During one week's period, 13, 11, 11, and 14 tubes were discharged and recharged on different days. Discharging and recharging rates of 6-8 tubes per hour appear possible. A total of 87 uranium column discharges and recharging have been made to date using the C Reactor equipment. Minor modifications to the charging machine are under way preparatory to training of C Reactor operating personnel in its use. The 16-tube prototype rupture detection apparatus, using halogen-filled GM tubes, is being installed in the charge-discharge pattern at C Reactor.

For the New Production Reactor, installation of the Prototype Concept Evaluation Loop in 189-D Building is estimated to be 85% complete and construction has been scheduled for completion in March. In joint development, the test section of a zirconium tube-to-nozzle joint which was thermal-cycled 3,221 times successfully was removed for inspection; disassembly of the test section revealed that slight leakage had occurred at both ends during the thermal-cycling with the greater amount occurring at the banana-seal end; a large amount of a foreign material, apparently iron oxide, was found deposited in each seal cavity; the cause for leakage at the banana-seal was not apparent unless it could be due to this foreign material working its way under the seats of the seal; the leak at the bell-ring seal was determined to be the result of a small angular nick on the outer sealing lip. Two test sections of a joint design, wherein the zirconium tube has been rolled into a stainless block in a manner employed in boiler construction, have been received from the Canadian General Electric Company for testing at Hanford; authorization to test these joints under Article II, Section 9(a) of Prime Contract W-31-109-Eng.-52 was received from the Atomic Energy Commission on February 12, 1959. Drawings and purchase specifications are being prepared for the instrumentation required to evaluate decontamination techniques and rupture detection techniques in a recirculating loop in the ETR Facility at Arco. Drawings were issued and fabrication initiated on a mockup to test stresses in a process tube deflected to simulate graphite contraction and to evaluate required forces for insertion of a process tube in a deflected graphite stack.

Use of poison splines continued at D and KW Reactors. At KW Reactor, one spline was inserted on February 9, 1959, and twenty during an outage on February 25, 1959. On February 27, 1959, 24 splines were removed from KW Reactor at a rate exceeding six splines per hour. At D Reactor, 22 splines were inserted on February 3, 1959, in a startup test and use of splines for flattening control continued such that approximately 20 splines were in use at month's end; during the February 3 outage all spline caps and seals on D Reactor were replaced (approximately 125). Equipment is being assembled to extend spline usage to KE Reactor.

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In the In-Core Flux Monitoring Program, a prototype machine for inserting and removing wire for monitoring the gamma (and hence neutron) flux has been completed by the Hanford Laboratories Operation Technical Shops and initial out-of-pile tests are under way. Victoreen Instrument Company and Anton Electronics Laboratories have initiated work on separate five-channel prototype gamma-sensitive in-core monitor assemblies which employ ion chambers. A proposed development contract with Battelle Memorial Institute for a thermally-compensated, thermal neutron sensing chamber system is being processed for approvals. A Production Test to evaluate the in-core flux monitors is being circulated for approvals.

In reactor confinement, testing of fog-spray nozzles in 189-D Building has led to the selection of Rockwood Sprinkler Company Model L-11-A. The test site has been modified to test the spray nozzles in a simulated rear-face enclosure with simulated air flows and smoke bombs.

Low bidder on the prototype, solid-state, analog-to-digital converter for the B Reactor temperature monitoring system was EPSCO. The order is being processed through Purchasing and the Atomic Energy Commission.

Low bidder on the high-speed temperature scanner for Project CGI-802 was EPSCO, though the bid price exceeded currently authorized funds. Several discussions were held with EPSCO personnel to discover what fringe equipment was included on the bid that could be removed, so that a more acceptable price could be obtained, still retaining all required functions.

Acceptable operation of the segmental recorders of the reactor gas moisture monitoring system has been obtained following a cooperative effort of an Instrument Development engineer and Central Maintenance and Plant craftsmen to pinpoint and correct minor operating and maintenance problems on a day-to-day basis.

In the tube replacement program, a second prototype, light-weight, long hydraulic cylinder was shipped by Miller from Chicago on February 16, 1959; and shop evaluation of an air-powered, roller tube chopper was successful with chopping times of 35 seconds.

Testing of silicone-coated thermocouple wire for C Reactor has shown problems with moisture migration and radiation damage. Failure in the moisture migration test is believed to result from overheating of the Mylar tape moisture barrier; specification of a lower temperature curing silicone resin for the glass insulation may eliminate this problem. Acceptable radiation resistance was obtained with Dow Corning 916 silicone. A visit to the fabricator's plant was made on February 16, 1959, to resolve technical problems. Even with the low resistance to moisture encountered, the tested thermocouple wire was superior to previously used polyethylene wire. Development of an improved thermocouple wire junction continued with Lewis Engineering.

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Visitors

Frank Mattes of Westinghouse Electric Corporation, Pittsburgh, Pa., visited Electrical Equipment Development on January 26-29, 1959, to consult on applications of static switching controls.

The following off-site personnel visited Materials Development:

Ken Newman of Turco Products Company, Los Angeles, California, visited on February 3, 1959, to discuss problems and exchange ideas concerning decontamination.

S. E. Mueller of Bonney-Floyd Company, Columbus, Ohio, visited on Feb. 4, 1959, to discuss application of cast-iron fittings for NPR and other applications.

Don Miner of G-E Metallurgical Department, Detroit, Michigan, visited on February 18, 1959, to discuss splines and metal alloys.

Trips

R. L. Loundagin visited Continental Oil Corporation in Wallingford, Connecticut on February 14-18, 1959, to discuss problems associated with manufacturing of thermocouple wire under Specification HWS-6355.

J. W. Green visited Barton Instrument Company in Los Angeles, Calif., on January 18-21, 1959, to firm up the design on the crossheader pressure differential instruments.

R. B. Willson, on February 23-27, 1959, visited E. I. du Pont Company in Savannah River, Georgia, General Mills Company in Minneapolis, Minnesota, and Metron Instrument Company in Denver, Colorado, to consult on the design of the cap remover position readout system.

Significant Reports Issued

Undocumented - "Status Report - NPR Fitting Development Activity," J. H. Fastabend, February 15, 1959.

Undocumented - "NPR Electrical Developments," R. S. Hammond, February 3, 1959.

Undocumented - "Trip Report - Shell Development Company, Emeryville, California, 1/11-14/59," A. N. Iverson, Jan. 22, 1959.

HW-58972 - "NPR Flow Monitor Prototype - Bristol Unit No. 1 - Interim Report," J.D. McCullough and A. J. Lindsay, January 29, 1959.

HW-59082 - "Cooling Water Pressure or Flow Instrumentation - Lead Reactor - Budget Study Report," J. D. McCullough, February 2, 1959.

HW-59127 - "In-Core Flux Monitoring - All Reactors - Budget Study Report," J. W. Green, February 5, 1959.

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C. Plant and Industrial Engineering

1. Drafting Operation

Summary of Drafting Operation services provided is:

Revised or New Drawings, BPFs, Graphs and As-Builts	178
Microfilm drawings added or retired	2892
Film prints produced	120
Check prints produced	327
Catalogs Added	145
Total customers serviced	295

2. Industrial Engineering

Metal Handling, 300-100

The feasibility of having the 100-K Area charge magazines loaded by the FPD is being investigated. Data accumulation is complete and a summary report is being prepared.

Vendors were visited to obtain detailed information about standard items of material handling equipment for use in systems for 105 Buildings. Design for an installation for 105-F was initiated.

Portable Powered Operator for Cross Header Valves

The prototype has been installed in 105-KW and has been operated successfully. Generally, the unit was well liked by the operation personnel who used the unit during the test. The test has shown that several modifications could be made which would still further improve cross header valving. These improvements are being referred to PEO for incorporation in the installation of the remaining units in the other reactor buildings.

Industrial Engineering Service to D-DR Reactor Operation

Film analysis of the 105-D material handling system has been completed. The summary of the analysis and the recommendations for improvements are being discussed with D-DR Processing Operations. The analysis indicates that charge-discharge rates can be increased by 50 percent with the use of improved methods and minor equipment changes. IEO assistance was given to D-DR Processing Operations on planning and scheduling of outages. Schedule boards have been purchased for D-DR Processing Operations and have been used during the January and February outages. Some improvement has been noted in outage work performance since the installation of this type of scheduling. Further work is being done to develop still better scheduling methods.

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3. Reactor, Plant Engineering

Reactor Atmosphere Moisture Monitor Sampling

Preliminary results on higher volume pump tests at 105-F appear favorable. Quotations for new vacuum pumps from 2 of the 5 recommended vendors have been received.

Ball 3X Improvement

Copies of an improved ball pick-up nozzle recently tested by the Mechanical "B" Development Operation were distributed to interested Processing Managers for their information in securing stand-by nozzles for their reactors.

Isotope Manufacture for AEC

A proposed plan for increasing the manufacture of isotopes supplied to AEC was scoped, sketches prepared and an estimate procured on a priority assignment basis for the Production Operation. The investigation indicated that the investment for expanded facilities could not be justified at this time.

Metal Storage Facilities - 105-D

Plans proposed by Reactor, Plant Engineering to utilize space in the #10 Exhaust Fan Room at 105-D for new metal storage were accepted by D-Processing Operation.

Vibration Studies

Vibration data from 105-H indicates that crossheader vibration decreased somewhat with the installation of the "J" type connectors. Measurements are being made at various points on a "J" connector to determine its "on-pile" vibration pattern.

Vibration pick-ups have been installed on rear crossheaders and pigtails at 105-DR. Similar work is scheduled for 105-B and F. This work will provide vibration data for use in a general study of rear face piping by FEO and for comparing conditions at the various reactors.

K Area Charging Machine

The improved charging machine is being readied for an on pile test. The new machine permits handling of two full magazines and one empty at the same time.

Downstream Dummy Pre-insertion

All equipment has been delivered to the respective reactor buildings. Each Processing Manager has been sent a sample procedure for pre-inserting the downstream dummy charge.

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Heat Treating Facility - 1717-H

Bids for the Propane Gas Storage Tank were reviewed and comments forwarded to Central Maintenance Operation. Print H-1-11706 - Tool Steel Heat Treatment Facility was forwarded to Central Maintenance for comment.

Plans were made for 2 - one hour training sessions in Heat Treatment for IPD Mechanical Engineers, 1717-H Craftsmen and Supervision in cooperation with J. C. McLaughlin, of Standards Engineering who assisted in procurement of information and training films.

105-B, D, F, Electrical Distribution System

A scope report for the "Expansion of the 105-B, D, F, Electrical Distribution System" was issued February 16, 1959. A request has been sent to Project Engineering Operation to prepare a project proposal for obtaining advance design funds so that design and procurement of long term delivery items can be initiated as soon as possible.

4. Water Plant and Utilities Engineering

Engineering in Support of Power Forecasting

An estimate of savings by use of interruptible power and load control was made covering Fiscal Year 1959. A special control program was started to take advantage of the planned outage at KE to maximize savings during the next three months. Work was started on revised Fiscal 1960 and five-year forecasts.

4500 HP Motors - 190 Buildings

The inspection program on these units has continued. Twenty-three units have now been examined by removal of end-bells. As a result, one motor stator has been returned to the vendor for repair at his expense. The examinations of the balance of units have in a few cases, shown the need for some minor re-tieing of stator coils. Several sets of brushes were inspected and recommendations made for improved performance.

Acid Feed Revision

Continued effort was directed toward improving operation of the aluminum oxide-sulfuric acid feeder at 183-B. The reaction vessel and vapor exhaust have been re-designed to minimize the adverse effects of an unpredicted acid mist mixed with water vapor from the reaction. In addition, the vendor is to furnish the aluminum oxide with at least two-thirds of the troublesome dust-size particles removed. Scoping of a plant-wide project is in progress.

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High Voltage Splice

As a result of several plant requests, several variations and splicing methods were studied and sketches were prepared showing splices which may require less maintenance time to make up. New materials were studied and a particular room temperature vulcanizing silicone rubber was found to have many desirable characteristics. Arrangements are being made to test and develop this material as it shows promise of having more widespread plant use than the original study would require.

5. Standards Engineering

Production Maintenance

A "Check List for the Overhaul and Inspection - Elevators - Class-"B" 90 day Inspection and Lubrication", (Form A-5400-086) was designed, duplicated and sent to the various IPD people concerned with elevator maintenance and safety. Copies were also routed to CPD and FPD people who had indicated they may be interested in using this form.

Spare Parts

Stock Adjustment Requests processes		46
Maximum Authorized dollar value of new items added by SAR's	\$25,600	
Maximum Authorized dollar value of spare parts requested by letter to Project Engineering	600	
Maximum Authorized dollar value of spare parts requested for Projects by SAR's	24,000	
Number of Engineered spare parts items reviewed		57
Number of Drawings ordered revised		5
Actual dollar value of items deleted from Spare Parts Stock	17,000	
Maximum Authorized dollar value of items deleted from Spare Parts Stock	17,690	

Time spent during the month working with Research and Engineering Operation and Spare Parts Records in an effort to coordinate the handling of spare parts for Panellit pressure gauges. As of this date, the new listing of these parts has been forwarded to all IPD Maintenance Operations for review and comment.

Engineering Standards

The HAPO Standards group has agreed to assist Stores Operation in revising several Stores catalog captions to agree with existing HAPO Standards. A meeting to effect this will be held with Standards and Stores Operations personnel.

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Columbia River Studies

Arrangements were made for additional sample collection and chemical analyses at selected sites along the Columbia River upstream from Hanford. Visual observation by Regional Monitoring Operation tends to confirm Priest Rapids damsite as the source of recent increases in river turbidity. This points up the need for close liaison with upstream facility operators.

105-F Downcomer

Recent modifications appear to have improved the base water level on the top tray of the 105-F downcomer by a fraction of a foot. Dynamic pressure measurements on the lid show transient pressures greater than 2.5 psi with fluctuations greater than 4 psi occurring in less than 0.1 second. Pressures measured are not such as to be of concern, but the significance of the vibration has not been fully evaluated.

Increased Flow in 183-DR Filter Plant

A 20-inch cross-tie line from the 16-inch filtered water line to the 24-inch backwash water line in the 183-DR building should provide ample water for backwashing the DR filters, thereby enabling all of the water transferred via the 30-inch backwash and make-up line to be used for make-up.

This new line along with the proposed modifications in the make-up line should increase the make-up capacity about 12,000 gpm, all of which would be available to 105-DR. Design is now essentially complete and arrangements for initiating work are in progress.

105-DR Downcomer

Both the near and far 105-DR downcomers were inspected during the past month. In the near downcomer the welds securing the I-beams to the steel liner were cracked to varying degrees at trays No. 4 through No. 8. Also the 3/8-inch steel liner at tray No. 4 was cracked at the bottom clip angle. In the far downcomer there were three cracked clip angle welds and three breather pipes were partially or completely loose. One pipe was wearing a hole in the downcomer steel liner. This pipe was removed before start-up.

Design changes covering the repairs of both far and near downcomers were issued this past month. These repairs include removing breather pipes, perforating the trays, reducing the area of the horizontal support beams, welding a ☐ stiffener to the liner opposite the trays, and adding plates welded to the web and top flange of the beam and the steel liner.

Repairs in the near downcomer are currently being performed by Maintenance Operations.

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Craft Training

A maintenance schematic on the Beckman Dual Trip Controller was prepared and distributed to all IPD Instrument Shops. Transistor Service Manuals were also procured and distributed.

Manuals were prepared and classes were started on the maintenance and operation of the Poison Spline System. Seven operators and three maintenance craftsmen have attended to date.

Work has been started toward assembling and organizing training information for a simplified class in Heat Treatment for the Maintenance Machinists. These classes are tentatively scheduled for March.

6. Trips

B. C. Benedictson visited the National Plant Maintenance and Engineering Show and several selected vendors in the East during the weeks of January 26 - February 5, 1959, to obtain information required to assist in assigned material handling study.

February 4-8, 1959, W. G. Ruff attended the Industrial Engineering Conference in Berkeley, California; and visited General Electric plants in Oakland and Vallecitos to consult with personnel there regarding Industrial Engineering practices.

At the request of the AEC, R. T. Jaske and H. A. Kramer, attended a meeting in Ephrata, Washington, on February 6, 1959, between the AEC and the Grant County P.U.D. for the purpose of deriving a basis for an operating agreement.

A. McDonald traveled to Lynn, Massachusetts, and Schenectady, New York, to discuss maintenance problems on large rotating equipment.

T. M. Clement visited several industrial plants during the period January 22 to February 6, 1959, for the purpose of discussing craft training problems, mechanization of Maintenance costing and record keeping, power calculator training and other subjects related to the activities of the SEO and IPD Maintenance Operations.

W. W. Walker traveled to Seattle, Washington, on February 16, 1959, to obtain information from the meeting of the National Board of Pressure Vessel Inspectors pertinent to problems encountered in establishing standards and procedures for pressure vessels in IPD.

7. Visitors

F. P. Robinson, G. E. Apparatus Department, Pasco office, visited Hanford on February 10, 1959.

R. A. Tower of the Tower Equipment Company visited the plant on February 19, 1959.

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D. Project Engineering

1. Projects

<u>Number of</u> <u>Assignments</u>	<u>Description</u>	<u>Balance</u>
17	Active Construction Projects	\$2 494 578
5	Active Design Projects	15 956
3	Active Expense Jobs	354 499
17	Completed Projects - Accrued	3 649 916
30	Plant Assistance	43 138
27	Customer Work Orders	86 099
	Total	<u>\$6 644 186</u>

AEC-160 - Recirculating Gas-Cooled Test Loop

Work was resumed on this project on February 6 at the 105-DR Building. The compressor switchgear and the last motor generator set has been received and installed. Three of the new compressors were shipped from Schenectady on February 19.

A project proposal has been submitted to revise the scope of the project to change the start-up from nitrogen gas to helium gas. A directive modification was received prior to this revision extending the project completion date to June 30. Neither of these revisions has involved additional funds.

CG-558 - Reactor Plant Modifications for Increased Production

The second new rotating assembly for the DeLaval pumps has been received on the plant.

CG-600 - 100-C Alterations

The vendor's representative examined pumps No. 5 and 10 to evaluate erosion of the impellers and are in the process of making a new impeller based upon their findings. The schedule of receipt of the new impellers has not been submitted by the vendor (Byron-Jackson).

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

The water component test loop was shipped from Cincinnati on February 18, 1959.

CA-696 - Coal Car Shake Outs, 100-B, D, F, H, and 200-W Areas

All coal car shaker equipment arrived on plant January 19. The contractor started installation at B Area and has now completed the installation and testing of equipment in all areas. Beneficial use was obtained:

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284-W Building - 2-10-59
184-B Building - 2-17-59
184-D Building - 2-17-59

184-F Building - 2-18-59
184-H Building - 2-18-59

Work remaining to be finished includes final painting which has been deferred until weather conditions improve.

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

Design is now complete for 105-B, C, D, and F Areas. Installation of control lines, valves, and gauges is in process at 105-B. Helium analyzers were received on plant February 11, 1959, and these will be installed in the reactors as outage time becomes available.

CG-707 - Improvements to Reactor Nuclear Instrumentation - All Reactors

The preinstallation work consisting of electrical conduit, wire, and installation of terminal boxes and connectors has been completed at 105-H. Representatives from Victoreen were on plant February 17 through February 19. The purpose of their visit was to review prototype testing and to agree with Instrument Development engineers on controller equipment standards so that Victoreen could complete their production order.

CG-740 - Replacement of Central Viewers - 105-B, D, and F Buildings

Project CG-740 was closed out with accruals on January 27. The work remaining consisted principally of the installation of replacement lead glass at 105-D. This work was completed on February 25. This completes the work on Project CG-740.

CG-741 - Renovation of the Ball 3-X System - 105-C

This project is now approximately 83% complete. Installation of the new ball valves is complete, the new ball trough has been installed, and the ball washer installation is complete except for additional work required on the spray nozzles to keep them from vibrating loose during operation. Work has commenced on the installation of the hot ball separator on the top of the reactor.

CG-775 - Water Plant Capacity Expansion, 100-K Area

The management of installation of the test pump modifications has been turned over to Project Engineering. A work order for \$35,000 has been released to Construction Operation for this work. Work on the installation of the test piping started on Tuesday, February 24, 1959.

CG-781 - Service Building Additions - 1706-KER Building

The contractor started field work at 1706-KER on February 25, 1959.

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

Quotations were received on February 16, 1959 for the 118 point demonstration system from Radiation, Inc., and Epsco, Inc. The low bid, and actually only acceptable bid, was received from Epsco, Inc. The Commission has appointed General Electric Purchasing to negotiate a final contract with Epsco, Inc.

CGI-807 - Modifications to 1713-D Building

The bid package information was turned over to the Commission on February 16, 1959.

CGI-817 - Crossheader Pressure Differential Indicators, Hanford
Reactors

Design for all areas was complete on February 15, 1959. A purchase order was placed on January 13, 1959 for the differential pressure indicators. The first shipment of 60 units is expected by March 1, 1959.

2. Project Proposals

Project Proposals Approved

CGI-791, Rev. 1 Reactor Confinement
CAI-831 Fence and Badge House Relocation, 100-F Area
 (\$8,700 Design and Management Funds only)

Projects Awaiting AEC Approval

AEC-160, Rev. 6 Recirculating Gas-Cooled Test Loop
CG-708, Rev. 2 Installation of Additional VSR's, KE and KW
CGI-824 Remotely Operated Cap Removers, KE and KW Reactor
 Discharge Areas

Project Proposals Submitted

CAI-835 Additional Office Space, 100-D Area (2-11-59)
AEC-160, Rev. 6 Recirculating Gas-Cooled Test Loop (2-19-59)

Requests Received for Project Preparation, Revisions, and Changes

AEC-160, Rev. 6 Recirculating Gas-Cooled Test Loop
CAI-816 Power and Telephone Facilities
R-20916 Additional 101-C Pumps
R-20917 Expansion of the 105-B, D, and F Electrical Dis-
 tribution Systems
R-20675 Rear Face Cross-Under Lines, B, C, D, DR, F, and
 H Areas

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3. Visitors

Victoreen representatives (R. L. Sullivan and G. E. Lippert) were on plant February 17 through February 19.

Mr. Ed Budde from the DeLaval Steam Turbine Company arrived on plant site on January 27, 1959 to supervise the modifications to the 190 Building pumps. His clearance has now been extended for 60 days starting on February 27, 1959.

4. Trips

Mr. J. C. Major visited the General Electric Vallecitos Laboratory on February 23 and 24 to interview for a job transfer.

R. G. Knirck visited General Mills Company, Minneapolis, Minnesota, February 25 through 27 in connection with the cap removal development.

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E. EXPANSION OPERATION

1. Activities

Construction Planning

At the request of the Commission project proposals for the design and construction of the 230 kv connection from 151-N to the Hanford loop and the 100-N telephone facilities was started.

Consideration was given to means for expediting fixed-price contracting of certain NPR features. Such methods would be used only in those instances where time was so short as to offer only the alternatives of CPFF work or expedited fixed-price methods.

Graphite Planning

Agreement on joint use of the 2101 Building has been reached with Relations and Utilities Operation. A design study and cost estimate for the necessary changes in the building are being prepared by Construction Engineering Operation.

The report of renovation of the graphite machining facilities has been completed by Construction Engineering Operation. Renovation costs will be approximately \$375,000.

Zirconium Planning

Processing proposals for the fabrication of the pilot order of zirconium tubes have been received from five vendors. These proposals are being studied, and an engineer review will be submitted to the Commission later.

Administrative

A preliminary issue of the M&E list was issued for review and comment.

The second, up-dated issue of "Expansion Operation Procedures and Flow Diagrams" document was released.

Questionnaires for predictions of manpower requirements for NPR related Project, R&D, and Operations effort were sent to all HAPC components. Tabulations and analysis of the results were started.

A substantial change in organization for the NPR program was instituted late in the month. The principal impact on Expansion Operation was the assumption of full G. E. responsibility for all

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its field activities. Organizational planning was started toward assuming these additional responsibilities.

Design Review and Consultation

Reviews were completed and comments were offered on the following scope design items:

1. HW-57045-RD Functional Requirements of the Containment System.
2. HW-57012-RD Pile Gas System.
3. HW-57044-RD-2 Requirements of the Primary Loop Control and Instrumentation Systems.
4. SK-1-26736, SK-1-26737, SK-1-26738, SK-1-26739, SK-1-26740, SK-1-26741 Reactor Piping Diagrams.
5. SK-1-29766, SK-1-29800, SK-1-29801 - Electrical One Line Diagrams.
6. SK-1-29451 Raw Water - Circulating Flow Diagram.

A rough draft report on N Reactor Operating Efficiency Factors was prepared during the month.

Expansion Design Council

The Expansion Design Council approved the following criteria:

1. HW-57009 Graphite Moderator
2. HW-57014 Ball 3-X Safety System (provisional approval)
3. HW-57039 Electrical Systems (provisional approval)
4. HW-57043 Design Bases - Part I - General

2. Visitors

Messrs. Tower and Shriver, representing Panellit Services Corporation, visited the plant February 18, 1959, for purpose of discussing methods of contracting for instrument system installation and for instrument system maintenance.

The Council also approved the selection of two steam boilers subject to satisfactory over-all plant design compatible with a two-boiler installation. The selection of six primary cooling loops as a basis for detail design and the use of a yard crane rather than permanently installed facilities for handling 181 pump motors was also concurred in by the Council.

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F. Principal Engineers

Principal Engineer

1. Significant Reports Issued

HW 59158, "Effects of Latest BPA Estimates of Power Value on NPR Economics", W. J. Dowis, 2-5-59.

HW-59245, "Power Generating Facilities for NPR", W. J. Dowis, H. R. Kosmata, E. M. Kratz, 2-12-59.

J S McMahon
D L H
MANAGER
FACILITIES ENGINEERING

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EMPLOYEE RELATIONS OPERATION
FEBRUARY 1959

PERSONNEL DEVELOPMENT & PLACEMENT

The fifth in the series of PEM-I courses in IPD began early in February. Sixty-four members of management are scheduled as participants with a number of shift people included, as in the previous series.

E. C. Wanner - Consultant, Specialized Technical Education, Engineering Services visited HAPO on February 19. Discussion with FPD and IPD Engineering Section representatives on services available in the technical education area was coordinated by the Manager, Personnel Development and Placement.

Recruiting assistance was provided to the central placement operation during the month. The Manager, Personnel Development and Placement participated as a member of the Company recruiting team at California Polytechnic Institute and the University of Southern California.

Action was taken to initiate a 50% tuition refund to employees qualifying under the plan. Thirty-six IPD employees earned the refund for the first semester at the University of Washington Center for Graduate Study.

The 1959 series of Understanding Human Behavior was started in IPD this month.

PhD and experienced BS/MS recruitment continues at a seasonal high level. Transfer activity continued heavy in all categories.

Five experienced BS/MS candidates were interviewed during the month with one offer being extended and two more being prepared. Seven PhD candidates were interviewed during the month with two offers being extended and three more being prepared. One was a former HAPO employee.

There were four transfers into the Department during February. Three of these were from CPD to Reactor Processing and one was a Technical Graduate permanently assigned within the Department. There were two transfers out of the Department during February, one to HLO and one to the Atomic Power Equipment Department - San Jose. There were two other exempt losses, one an optional retirement and one a resignation.

There were seven non-unit additions to the rolls, thirteen removals, and four transfers within the Department. Eleven requisitions were filled with nine remaining open at month end.

MAIL AND DUPLICATING

An office type, precision paper cutter was installed in the 100-H Duplicating Office for department-wide use in handling small size forms, half-page announcements and other non-duplicated items requiring trimming.

A survey of the IPD mail system was completed and an additional daily mail delivery to all administration and other office buildings was inaugurated on March 2. The additional delivery should accelerate service between 700 and 100 areas as well as improve service on internal IPD mail. Concurrently, a complete summary of mail schedules and dispatch times from IPD mail offices

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was published in the March 3 issue of the News Bulletin.

The third class session in the current Secretarial Proficiency Course was held on March 4 in 1704-B Building. Eleven secretarial-clerical people were in attendance.

COMMUNICATION

Mass communication activities included the publication of eight "Management NEWS Bulletins", one "Round Table Guide", one "Memo from the General Manager", and one issue of a new publication, the "IPD Employee Headliner". GE NEWS coverage included 12 items about IPD activities totalling 175 column inches, or 21% of all available space. One Priority Message was disseminated, and one Management Information meeting was held.

Organization and Policy Guides A3, A6, and 1.7, "Policy on Reduction of Force" were issued.

UNION RELATIONS

A representative of the Department of Labor has been at HAPO investigating lunch relief practices for Power Operations, at the request of the chief steward of the Operating Engineers.

Notice has been received that the HAMTC has filed a "Charge Against Employer" with the NLRB. The basis for this charge is that the Company's "unilateral initiation" of the Pile Operators Selection Program represents a refusal to bargain.

Industrial Firemen at HAPO have filed a lawsuit against the Company for "back pay" based on the allegation that the bus arrives at White Bluffs anywhere from 15 to 20 minutes before the actual starting time of their shift, and during this period they perform "work" for the Company.

Notice of a desire to arbitrate a Radiation Monitor's grievance regarding overtime was received this month. We do not feel that this represents an arbitrable issue and have so informed the HAMTC.

Sixteen supervisors attended the "You and Labor Law" program presented 2-9-59.

Six issues of the "Union Relations Information" bulletin were prepared and distributed during the report period.

The HOO-AEC Labor Standards Board approved one job for assignment to plant forces which is estimated to cost \$16,000. Since the procedure for obtaining LSB approval was initiated in IPD, 127 jobs have been approved representing a total cost of \$3,950,725.66.

EMPLOYEE COMPENSATION

A report of salary comparisons covering the semi-technical or nonprofessional job categories conducted among the larger Atomic Energy Commission Prime Contractors was received during the period and will be used in the validation of the proposed evaluation plan and salary structure for the nonexempt, non-unit salary study.

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During February a concerted study was made of the relationship between Department, HAPO, and Company salary statistics. A complete Performance Appraisal and Salary Review program was decided upon to ensure careful control of salary action so as to obtain appropriate conformity to Company statistics. Continuing effort was directed to the consolidation and realignment of work assignments and practices to meet the requirements of operation with reduced personnel.

IPD received 86 new IPD suggestions and 20 from other Departments. A total of \$672.50 was paid in awards for 48 adoptions, 3 of which were without awards. Auditable savings amounted to \$2,548. Rejections were completed on 102 suggestions. The average award of 1959 is now \$20.33, and the ratio of awards to savings is 20.9%. The backlog of active suggestions was reduced by 48 to a 303 total.

HEALTH & SAFETY

The accident trend in IPD remained stable during February 1959. There were no Disabling Injuries and the Medical Treatment Frequency compared favorably to the preceding month; the current frequency being 1.94.

A few former centralized functions of Safety & Fire Prevention are being studied with the intent of proper dispersal at Area Levels, such functions as the handling of the Award Plan, Statistical Data, and handling of Industrial Medical problems.

A comprehensive inspection of the K Area was conducted during February. A similar inspection of B-C is in progress during March.

FIRE PROTECTION

IPD Fire Protection responded to two alarms during February: February 4, 1959, 11:20 A.M. - Outer Area, 1/2 Mile South West of Underground Storage - Control burning by Road Maintenance got out of hand. Damage: \$10; February 12, 1959, 8:41 A.M. - 100-H Area 1760-H Bldg. - Accidental Alarm. No loss.

E. J. Fitzmaurice

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FINANCIAL OPERATION
MONTHLY RECORD REPORT
FEBRUARY, 1959

General Accounting

An ATH authorization was approved February 20, 1959 to Atomic Power Equipment Department, in the amount of \$4,500 for engineering assistance and development study for "Rod Position Indicating and Logging System."

Construction Completion and Cost Closing Statements were issued in February on Project CG-786 "Flux Monitor Dual Trip System 105-B, C, D, DR and H", and Project CG-740 "Replacement of Central Viewers 105-D and F Areas."

Product Cost and Budgets

General Manager approval of personnel and overtime hour requirements was received February 10.

January's operating reports were issued to the Reactor Operations utilizing the new format. Comments have been requested from the managers and supervisors involved and will be evaluated as received to aid in correcting any current deficiencies.

Work is continuing on the study of integrated data processing and for cost accumulation and reporting. Meetings were held with the General Accounting representative and Procedures Specialist.

Personnel Accounting Operation

The first quarterly report to share-owners has been distributed to participants of the Savings and Security Plan. This is a regular Company quarterly report which will be distributed to Savings and Security Plan participants regularly in the future.

Auditing

Verification was made of a portion of the health benefit payments made by Metropolitan Insurance Company to or on behalf of IPD employees during the month of January, 1958. The verification was requested by K. H. Ayer, Manager-Insurance Plant Accounting, Schenectady, New York, in connection with the annual test-check of one month's payments charged by the Insurance companies under the General Electric Insurance Plan.

Changes in the procedures for the control of Material Passes were discussed with other HAPO auditors and agreements with representatives of Security and Patrol were reached at a joint meeting.

A current list of periodical subscriptions was obtained from the Plant Library and the Level 3 Managers were informed of the individual subscriptions charged to their operations.

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Procedures

Development studies were made concerning paperwork techniques to be used to facilitate the visual comparison of reactor data output from automatic recording equipment.

General assistance was given to Research and Engineering in designing forms and paper flow used as input to their newly designed Reactor Master File.

General

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

DR MacNaughton
Manager - Finance
IRRADIATION PROCESSING DEPARTMENT

DR MacNaughton:apa

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