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HW--73153

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IRRADIATION PROCESSING DEPARTMENT

MONTHLY REPORT

MARCH 1962

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HANFORD ATOMIC PRODUCTS OPERATION

GENERAL ELECTRIC

RICHLAND, WASHINGTON

MASTER

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IRRADIATION PROCESSING DEPARTMENT
MONTHLY REPORT
MARCH, 1962

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By Authority of CG-PR-2

Compiled By
IPD Personnel

RM Iten 8-6-92

IL Phillips 8-17-92

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April 15, 1962

RICHLAND, WASHINGTON

Work performed under Contract No. AT(45-1)-1350 between the
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SUMMARYRESEARCH AND ENGINEERING

Power levels were restricted by administrative limits at the K and C Reactors, by bulk outlet temperature considerations at D Reactor, and by tube corrosion considerations at the B, DR, F, and H Reactors.

A coextruded zirconium-clad fuel element failure occurred at KW Reactor and is currently being examined for classification. The element was part of a test to provide irradiation experience for fuel fabricated by the process which will be used to manufacture NPR fuel and had reached an exposure of 1647 MWD/T.

Tests of a thermocouple element as a crud film detector in KER-1 have successfully reached an exposure of 600 MWD/T, and the decontamination phase of the test will be initiated at the next outage; five enriched N-sized inner tube elements charged into KER-2 have reached an exposure of 2860 MWD/T and will be discharged at the next outage; tests of N Reactor concentric tube assemblies were initiated in the recently modified KER-3 and KER-4 loops.

The first capsule containing N Reactor graphite was discharged from the GETR at an exposure equivalent to approximately 1.3 years in the center of the N Reactor. Physical measurements will be made and the samples prepared for re-charging.

Two successful startups have been carried out under a production test at B Reactor in which a 50-column E-metal core, compensated by poison splines during normal operation, served to shorten the minimum downtime approximately ten hours and increase production an equivalent of seven effective hours. A production test supplement is under preparation for initial trial of a similar partial-xenon-override core in a K Reactor.

The N Reactor Stack Purity Test was carried out successfully as authorized by HW-72654, PT 2. The observed diffusion length of approximately 85 cm compared favorably to the 83 cm measured in the experimental mockup which was not supplied with cross-coolant nor ball channel voids.

MANUFACTURING

Reactor input production (MWD) was 9.6 per cent above forecast; 12.8 per cent above at the six old reactors and 6.4 per cent above at the K's.

Over-all time operated efficiency was 73.2 per cent (66.1 per cent forecast); 69.5 per cent at the six old reactors and 84.4 per cent at the K's. Efficiency was above forecast, particularly at the old reactors, due to less outage time than forecast for maintenance and the correction of water leaks.

There was no increase in the combined reactor instantaneous power level. The individual reactor record power levels were increased 10 megawatts at B (1930 to 1940) and 25 megawatts at D (1945 to 1970), the latter being an all time high for one of the five old reactors. A new production record was achieved at KW exceeding the previous record (Dec. 1961) by 3.5 per cent.

Seven ruptures, four I&E natural and three I&E enriched, were removed from the reactors. Two of the natural metal ruptures were at DR, one at B, and one at H. The enriched ruptures were at H, KE & KW.

FACILITIES ENGINEERING

In support of the tube replacement program at the K Reactors, preliminary designs are being prepared for a number of components of the revised process tube assemblies.

The broaching accomplished at 105-C Reactor on VSR channel number 41 decreased rod insertion time on the channel from 2.41 seconds to 2.22 seconds. Sufficient graphite was removed from the tube block of process channel number 4092 to expose a portion of tube wall to the VSR channel.

A prototype rear nozzle elbow and replacement connector was installed on the rear face of 105-C Reactor for test purposes. No operating difficulties have been encountered with this prototype during the first operating cycle.

Approximately 80 process tube channels in 105-DR Reactor were reconditioned with a work platform-mounted drill in a successful test of the prototype. Operating time cycles of five to ten minutes per channel were achieved. Drilling was front-to-rear.

Localized cracking of a 105-D Reactor rear riser was found to be caused by stress corrosion brought about by water deposited salts and high stress at a previously repaired area. No additional evidence of cracking was detected. Repair was successfully accomplished.

The last stator was received at HAPO in the 4500 HP Motor Modification Program. It is currently awaiting installation. This will complete the program with a total of 32 stators rewound with modified Class A windings, and eight with Class B.

Preparation for final tie-in and dual area shutdown for Project CGI-844 (100-K Area Coolant Backup) is on schedule.

Project CGI-861, Expansion of Electrical Distribution Systems, 105-B, D, and F Buildings was completed with exceptions, March 26, 1962.

NPR PROJECT

An IBM 7090 Program is in operation to determine the flow rate out of potential breaks in the primary loop piping. This program is also being used to study loop depressurization transients.

An analog study of the operation of the NPR secondary cooling system has been completed.

Estimates have been supplied of the Phase III fuel exposure at which throw-away costs become equal to 10,000 MWD/T reprocessing fuel cycle costs.

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Burns and Roe submitted a preliminary outline and sketch which would eliminate the complex outlet matrix type mixing header. A preliminary analysis of this proposal indicates that the new arrangement is acceptable although flow through the reactor will tend to be channeled to a greater extent than previously.

Testing of the fuel sorting equipment at AMF Atomics has been delayed by difficulties in obtaining cylinder shaft replacements. Tests on the charging machine at HAPO have demonstrated the manipulation of loaded magazines and magazine discharge into a simulated process tube.

Tests continue on the first primary coolant pump at the vendor's plant. At full speed tests the driver end backup seal failed and some redesign will be required.

Horizontal rod testing continues both in the vendor's plant and at the 189-D Laboratory. The vendor's modifications to the rod seals have to date indicated successful performance.

Flow monitor venturi tubes fabricated to date have unacceptable body forgings. Salvage procedures have not been successful and new forgings are required.

Studies are under way to determine alterations necessary to the TC-1100 Building to provide a more permanent type Administration Building.

The top thermal shield and aluminum reflector assembly have been completed on the reactor. The top primary shield structure assembly is progressing satisfactorily with all "I" sections and filler plates set in place.

Preparations for the installation of the zirconium process tube assemblies are continuing.

Processing of the last 21 process tubes received from Harvey Aluminum is proceeding with 14 tubes autoclaved and the remainder in process of being autoclaved.

Kaiser Electricians walked off the job site March 26, 1962, and the carpenters March 27, 1962.

All the installed stainless steel tubing for the flow monitoring system has now been removed because of the cracking problem; preparations are being made for replacement.

Cleanup and preparation for maintaining cleanliness, temperature and humidity conditions in the control room have been initiated prior to installation of panels and other critical equipment.

Work has started on shop fabrication of two 5/8 inch reactor connector tubing assemblies. Shipments of high-pressure primary pipe have been made from the Ladish and Taylor Forge plants. Field installation work has not been resumed to any significant extent, except for planning and receipt of random pipe spools.

GENERALRESPONSIBILITY

There was no significant change in responsibility.

FORCE SUMMARY

	<u>Exempt</u>	<u>Non-Exempt</u>	<u>Total</u>
General	7	1	8
Research and Engineering	104	60	164
Manufacturing	421	1386	1807
Facilities Engineering	100	39	139
NPR Project	94	28	122
Financial	17	13	30
TOTAL	743	1527	2270

SAFETY, SECURITY AND RADIATION EXPERIENCE

There were 90 medical treatment injuries, two security violations and no disabling injuries or radiation exposures exceeding operational control.

INVENTIONS

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

<u>Name</u>	<u>Date</u>	<u>Title</u>
D. A. Hoover	March 20, 1962	Self-Releasing Grappling Device

O C Schroeder
for the General Manager

AB Greninger:DLD:kn

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RESEARCH AND ENGINEERING

PROCESS AND REACTOR DEVELOPMENT

REACTOR FUELS

Present Reactor Technology

Overbore Fuel Development

Performance of the overbore fuel at the C Reactor was normal with no additional fuel charged or discharged during the report period.

Self-Supported Fuel

Two columns of KVNS fuel elements having an exposure of 780 MWD/T were discharged on 2-13-62 from KW Reactor.

Bumper Fuel Development

Two columns of bumper fuel elements were discharged from the D Reactor on 2-24-62 at an exposure of 400 MWD/T. Both columns have been sent to 105-C for post-irradiation examination.

Other Programs

Seventeen columns of nickel-plated fuel were discharged from DR Reactor on 3-2-62 at an estimated exposure of 1100 MWD/T. The two remaining columns of coextruded fuel were discharged from KW Reactor on 3-12-62 as a result of a rupture occurring in one of the columns. The column containing the rupture had reached an exposure of 1647 MWD/T. The ruptured fuel element is being examined for failure classification.

Advanced Reactor Technology

NPR Fuel Development

The thermocouple element charged into KER-1 to evaluate the reliability and sensitivity of a thermocouple element as a crud film detector has achieved an exposure of 600 MWD/T.

Five 23-inch NIEL elements charged in KER-2 on 9-17-61 to evaluate high exposure fuel element distortion and swelling reached an exposure of 2860 MWD/T on 3-20-62. These elements will be discharged in the near future to permit modification of the KER-2 loop.

The two prototypic NAE1 fuel assemblies charged in KER-3 on 2-18-62 have reached an exposure of approximately 310 MWD/T.

Five NAE1 fuel elements were charged in KER-4 on 3-7-62 to provide loop operating experience with a partial charge of NPR fuel elements. Current exposure is 160 MWD/T.

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STATUS REPORT OF PRODUCTION TESTS

Test No.	Type Metal	Tubes	Reactor	Goal Exposure	Current Exposure	Remarks
IP-216-A	Normal prod. natural and enriched fuel elements	126	All	Normal variable goal		Provides for monitoring the performance of a sample of all normal production material to assist in development of a Quality Index for production use. Test is continuous.
IP-263-A Supp. A	Nickel-plated fuel	0	DR	Twice normal variable goal		Demonstrate on a pilot scale that satisfactory nickel-plate adhesion has been attained and that reducing nominal plate thickness from .6 mil to .2 mil does not affect this parameter. Test discharged on 3-15-62.
IP-272-A	I&E self-supported fuel	69	C	Variable +200		Provides for testing of CIVN geometry fuel in C Reactor ribless zirconium tubes.
IP-381-A & IP-431-A	I&E self-supported fuel overbore size	62	C	800 MWD/T		Provide preliminary qualitative data regarding irradiation behavior of larger fuel element designs. PT-IP-431-A expands the test facility up to 65 tubes.
IP-377-A	Five 23-inch N Reactor inner fuel tube elements, KER-2	1	KE	3000 MWD/T	2860 MWD/T	Elements charged in KER-2 on 9-17-61 for high exposure tests.
IP-397-A	Zircaloy clad enriched I&E fuel elements	0	KW	Variable		Provide irradiation experience for elements fabricated by NPR manufacturing process. Both tubes discharged on 3-12-62 at 1645 MWD/T.
IP-402-A Supp. A	Enriched uranium samples	1	DR		500 MWD/T	Zr-2 jacketed samples in NaK filled Zr-2 capsules charged 1-7-62, to evaluate effect of jacket uniformity on localized jacket straining. Test discharged 3-24-62.

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<u>Test No.</u>	<u>Type Metal</u>	<u>Tubes</u>	<u>Reactor</u>	<u>Goal Exposure</u>	<u>Current Exposure</u>	<u>Remarks</u>
IP-409-A	I&E self-supported fuel	2	KW	800 MWD/T		Provide qualitative data to confirm the fuel geometry design.
IP-432-A	Elliptical vs. regular bumpers	18	D	Variable	560 MWD/T	Provide a comparison of corrosion characteristics of "elliptical" bumper rails to current bumper rail design to determine their feasibility. Test charged during 12-16-61 outage. First two columns discharged on 2-24-62 at 400 MWD/T.
IP-448-A	One enriched thermocouple element; four 17-inch N Reactor inner fuel tube elements, KER-1	1	KE	< 2000 MWD/T	600 MWD/T	Test is to evaluate the reliability of thermocouple element and to evaluate temperature effects of crud in carbon steel system. Elements charged 2-17-62.
IP-477-A	Two 23-inch N Reactor fuel elements, KER-3	1	KE	< 3000 MWD/T	310 MWD/T	Elements were charged 2-18-62, to permit loop testing with fuel.
IP-477-A	Five 23-inch N Reactor fuel elements, KER-4	1	KE	< 3000 MWD/T	160 MWD/T	Elements charged 3-7-62, to permit loop testing with fuel.

Four capsules containing enriched Zr-2 jacketed fuel samples to determine the effect of jacket uniformity on localized jacket strain, which were charged into D Reactor on 1-7-62, were discharged on 3-17-62 at an exposure of approximately 1000 MWD/T.

Fuel Designation Codes:

OIIN	Old Reactors, second I&E model, natural uranium element
OIIINB	Old Reactors, third I&E model, natural uranium bumper rail element
CIVN	C Reactor, fourth I&E model, natural uranium element
CVIN	C Reactor, sixth I&E model, natural uranium element
CVINB	C Reactor, sixth I&E model, natural uranium bumper element
CVINS	C Reactor, sixth I&E model, natural uranium self-support element
KVNS	K Reactor, fifth I&E model, natural uranium self-support element
NIEL	N Reactor, inner tube, enriched uranium, first model
NINL	N Reactor, inner tube, natural uranium, first model
NAEL	N Reactor, concentric tube assemblies, enriched uranium, first model

REACTOR ENGINEERING

Present Reactor Technology

Zircaloy Process Tubes

Specifications for K Reactor smooth-bore Zircaloy process tubes were prepared and approved. A review of the production capacity of each of the qualified Zircaloy tubing fabricators was made. The results of this review were included in estimates of tube procurement schedules for C overbore and K Reactor retubing.

Water Mixer Fuel Element Tests

Experimental and calculational methods were used to evaluate the location requirements of water mixer fuel elements in C Reactor process tubes to control tube and fuel element corrosion. Experimental data were obtained to calculate R Values with the CIIN fuel element in redesigned process tubes having a nominal 0.093 inch rib height. The R Values obtained, although showing variations, are in general agreement with initial calculations.

Advanced Reactor Technology

NPR Hazards Review

The distribution of Volume I of the NPR Hazards Review has been delayed pending reclassification of certain pages of the document. The document will be reissued in the near future.

Technical Bases for Standards

Two additional Technical Bases were prepared during the report period. A total of 63 Technical Bases have been prepared in rough draft form.

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Technical Manual

Preparation of the NPR Technical Manual is continuing on schedule.

NPR Graphite Irradiation

The first capsule containing specimens of NPR graphite charged into the GETR on 11-30-61 was discharged on 3-12-62. The maximum exposure attained by the discharged samples is equivalent to approximately 1.3 years' exposure in the center of the NPR. Physical measurements will be made and the samples recharged into the GETR at a later date. A capsule containing new samples was charged into the reactor replacing the capsule which was discharged on 3-12-62.

REACTOR PHYSICS

Present Reactor Technology

E-N Load

The second E-N load in H Reactor was discharged at the end of January. Processing of selected batches of fuel elements for determination of conversion ratio has been initiated in the Redox plant.

Pinchbottle Program

The percent of recycled fuel in the enriched fuel present in the reactors at the end of February and discharged during February are given below:

Percent Of Recycled Fuel In Enriched Fuel

	<u>B</u>	<u>C</u>	<u>D</u>	<u>DR</u>	<u>F</u>	<u>H</u>	<u>KE</u>	<u>KW</u>
Feb. 28 Status	76	97	81	83	75	72	97	95
Feb. Discharge	80	90	5	46	77	72	86	97

Limited discharge at D Reactor resulted in a non-representative composition of recycled fuel.

Results of the analyses of three samples of recycled fuel were published in HW-72745, by R. P. Ringle and J. C. Steinhauser.

In-Core Flux Monitors

The five neutron-sensitive, in-core chambers installed in KW Reactor on 11-16-61 continued to perform satisfactorily.

Nuclear Safety

Various studies in the area of nuclear safety continued. These included the evaluation of the effectiveness of variable-poison splines, evaluation of

improved Panellit gage components, instrument circuit reliability and reactor kinetic studies. Results from each of these studies will be reported as they are obtained.

Basic Studies

Calculations are being performed to determine the power output from several different radioisotopic chains. The isotopes studied to date include Polonium-210, Uranium-232 and Plutonium-238. An IBM computer program has been developed to perform these calculations.

Advanced Reactor Technology

Exponential Pile Control Strength Measurements

Early calculations of the NPR control strength contained a small error arising from an assumption of the size of the control region of the rod. The error is apparently not large and will not affect the N Reactor safety analysis. The exponential pile will be utilized to remeasure the control rod strength. A detailed analysis of the NPR control and safety systems has been completed and documented as HW-72719, "Reactor Control and Safety Systems - NPR", 2-19-62.

NPR Phase III Operation Hazards Review

The physics aspects of various UO_2 fuel elements proposed for NPR Phase III Operation were reviewed to determine the impact on NPR nuclear safety. These studies include UO_2 fuel elements having a weight of 13 - 16 pounds per foot.

NPR Fission Product Inventory

An IBM computer program was utilized to evaluate the fission product inventory of Phase I, II and III Operation of the NPR. These fission products were separated into four specific groups - noble gases, halogens, volatile fission products and non-volatile fission products.

RADIOLOGICAL ENGINEERING

Radiation Control Experience

The following table summarizes the radiation exposure experience of critical IPD classifications through 8 weeks of the 1962 badge year:

Classification	Total Dose	No. of Employees	Average Dose/Employee	Extrapolated Year End Average	No. of Employees over 3r Extrapolated Exposure
Radiation Monitors	36461 mr	82	445 mr	2890 mr	36
Processing Operators	94863	255	372	2416	50
Pipefitters	44751	111	403	2617	45
Millwrights	32890	83	396	2571	33

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Lapse of Radiation Control

<u>Lapse of Radiation Control</u> <u>Distribution by Reactor and Component</u>									IPD
	<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>Totals</u>
Processing	1	0	1	0	0	1	0	0	3
Maintenance	1	0	0	0	1	0	1	0	3
Power	0	0	0	0	0	0	0	0	0
Suppl. Crews	0	0	0	0	0	0	0	0	0
Applied Reactor Engr.	0	0	2	0	1	0	0	0	3
Research & Engineering	0	0	0	0	0	0	0	0	0
Facilities Engineering	0	0	0	0	0	0	0	0	0
Central Maintenance	0	0	0	0	0	0	0	0	0
Reactor Areas	0	0	1	1	0	0	0	0	2
Assigned Totals	2	0	3	1	1	1	1	0	9
IPD General									
Outside IPD							1		1

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.

Effluent Water Data

The table below shows average concentrations of radionuclides in reactor effluent water from samples taken during February, 1962. Units are in 10⁻¹² curies/day.

<u>Reactor</u>	<u>As⁷⁶</u>	<u>P³²</u>	<u>Zn⁶⁵</u>	<u>Np²³⁹</u>	<u>Cr⁵¹</u>
B	77	6.2	17	110	450
C	117	9.4	26	310	580
D	94	8.7	45	420	1100
DR	97	8.0	61	170	1400
F	66	7.8	34	140	970
H	62	6.7	11	110	500
KE	73	15	25	120	880
KW	65	14	14	60	360

All data shown was taken with all reactors at a nominal 18 ppm alum feed.

Effluent from Nickel-Plated Fuel Elements

Final effluent samples from individual process tubes at 105-DR loaded with nickel-coated fuel elements showed no significant change from earlier reported results. For several months, the average P³² concentration has been 10 to 20 times the riser concentration. Results are being summarized for inclusion in a full report on the production test.

PROCESS TECHNOLOGY OPERATIONREACTOR POWER LEVEL LIMITATIONS

The reactor power level limitations that predominated during the month of March are as follows: B, DR, F, and H Reactor power levels were limited by tube corrosion considerations; D Reactor's power level was limited by bulk outlet temperature limits; and the power levels at C and K Reactors were basically restricted by administrative limits.

PROCESS STANDARDSHW-46000 B - Process Standards, Reactor

Two revised standards, A-030 and C-040, were issued during the month and two standards, E-020 and F-010, were deleted from the subject manual during the month. These were:

Process Standard A-030 - "Pressure and Flow During Reactor Shutdown"

An obsolete curve, Figure 2, was deleted from the standard. Current, similar information appears in Figure 1.

Process Standard C-040 - "Graphite Temperature Limits"

This standard specifies the number of graphite thermocouple stringers that must be maintained and the number of thermocouples required in each stringer.

Heavier gauge wire was authorized in thermocouple stringer construction to increase the life of the stringers. The number of thermocouples required in each stringer was reduced to enable stringer construction with heavier gauge wire.

Process Standard E-020 - "Film Formation Control"Process Standard F-010 - "Slug Inspection and Storage"

The above two standards were removed from the manual since all material in them was "Advice."

HW-4600 D - Process Standards, Reactor

Process Standards E-020 and F-010 were deleted from the subject manual during the month.

HW-4600 F - Process Standards, Reactor

One new standard was issued and two entire standards were deleted during the month. These were:

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Process Standard D-070 - "Reactor Confinement" (added)

This standard governs the utilization of the confinement system, CGI-791, which is being installed in the Hanford reactors.

Process Standards E-020 and F-010

These standards were deleted from the subject manual during the month.

HW-46000 H - Process Standards, Reactor

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

Process Standard C-020 - "Power Level Monitoring"

One of the provisions of this standard requires the calculated power level to be compared with power level instrumentation. This revision permits greater latitude in choice of instrumentation selected to perform the power level check.

HW-46000 K - Process Standards, Reactor

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

Process Standard A-050 - "Panellit System Control"

Three changes were made to this standard. These were:

1. Flow-measuring hardware specifications were updated.
2. Pressure-monitor gauges having a 400 psi span were restricted to use on poison-column-control tubes.
3. The frequency of required flow checks of pressure-monitor sensing lines was changed from six months to every three months.

Process Standard C-020 - "Power Level Monitoring"

Revisions to this standard were identical to those made for HW-46000 H, above.

The following standards are for the 105-KE Recirculation Facility. The standards have been revised to specify the requirements necessary for operation with the test facilities provided for by Project CGI-839.

Process Standard K-010 - "General Requirements"

Process Standard K-020 - "Operation Without FISSIONABLE Material"

Process Standard K-030 - "Single-Pass Operation - FISSIONABLE Material Charged"

Process Standard K-040 - "Recirculation Operation - FISSIONABLE Material Charged"

PROCESS CHANGE AUTHORIZATIONS

The number of process change authorizations issued during the month were: eighteen to permit temporary deviation from Process Standards - Water Plant, HW-27155 Rev1; one to permit temporary deviation from Process Equipment Standards, HW-41000; and eighteen to permit temporary deviation from Process Standards - Reactor, HW-46000. These were:

PCA #2-13 - "Crossunder Line Use, B Reactor"

Requirements of Process Standard A-030, pertaining to the newly installed crossunder line, were based upon the supposition that the flow capacity of the line would be approximately five times greater than actually experienced under test conditions.

This PCA, based on measured flow capacity, permitted use of the crossunder until February 6, 1962, under the specific conditions listed in the authorization.

PCA #2-14 - "Water Leak - B Reactor"

The maximum permissible condensate collection rate was slightly exceeded in early February, 1962, when it became apparent that a small process tube water leak existed in the rear section of the reactor.

Authorization was given to postpone the shutdown until February 15, 1962, when manpower became available to efficiently schedule the outage.

Specific operational conditions that must be met were listed.

PCA #2-15 - "Water Shut-Off Times, H Reactor"

Process Standard A-030 specifies that water may not be shut off two adjacent crossheaders. Water shut-off curves were based on calculations which assumed adjacent crossheaders were being supplied with coolant.

Static pressure measurements on both bottom crossheaders were required to evaluate flow capabilities of the crossunder line.

Heat generation calculations appropriate to the reactor shutdown time showed that flow could be safely shut off for a short time on both bottom crossheaders.

Authorization was given for flow shut-off to the bottom two crossheaders to obtain the desired data.

PCA #2-16, "Vertical Rod Insertion Times, D Reactor"

Appropriate process standards specify that vertical safety rods, following a number one safety circuit trip, must be in the reactor at least 90 per cent of their travel in a specified maximum time. An additional requirement specifies that adjacent rods must not be inoperable.

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During February, 1962, two adjacent rods were found to slightly exceed the maximum permissible drop time.

Authorization was given until February 23, 1962, to operate with two slow safety rods, provided power level restrictions of the PCA, which were imposed to meet the speed-of-control requirements, were met.

PCA #2-17 - "Crossunder Line Use - F Reactor"

PCA #2-18 - "Crossunder Line Use - H Reactor"

Conditions and provisions of these PCA's are nearly identical to those stated above in PCA #2-13.

PCA #2-19 - "Poison Column Control Facilities, H Reactor"

Process Standard F-050 requires that prior to charging a former PCCF tube with fissionable material, the rear and front-face ball valves and fittings be replaced with standard fittings and nozzles.

Manpower and exposure limitations recently required that six rear ball valves on PCCF tubes being returned to normal production remain on the reactor during the pending operating period.

Authorization was given to resume operation with six rear PCCF ball valves provided the precautions of the PCA were observed.

PCA #2-20 - "Water Leak, G Reactor"

Conditions and requirements specified in this PCA were nearly identical to those described in PCA #2-14, above.

PCA #2-21 - "Emergency Steam Export Pump Repair - H Reactor"

Process Standards - Water Plant, 190-B-070, specifies that an emergency steam pump shall be placed on the export system if electrical power is lost in a reactor area. This ensures adequate backup water if a power failure occurs at all areas and steam is lost at one area.

Repairs were necessary to the steam driven export pump at the above area, which necessitated removal of the pump from service.

Due to the extremely remote possibility of a power failure at B, D, F and H Areas concurrent with the loss of steam at one of the three reactor areas which have their steam turbines available, continued operation of C, D, DR, and H Reactors was authorized provided BPA power was normal.

PCA #2-22 - "Front-Face Leak, H Reactor"

Process Standard A-010 specifies a reactor shutdown for certain leak conditions of critical front-face fittings.

A leaking front-face valve connecting the pressure monitor-sensing line to the process tube flow-measuring venturi was observed held in place by approximately three threads.

Previous laboratory mock-up tests have shown that should this fitting blow-out, the resultant flow loss to the process tube would be small. Permission to continue operation was authorized with restrictions on the tube outlet water temperature.

PCA #2-23 and PCA #2-24 - "Temporary Removal of High Pressure Crosstie - K Reactors"

Process Standards - Water Plant, HW-27155 Rev1, Standard 190-B-090, specifies that the high-pressure crosstie line (HPCT) normally be in service to provide a last ditch emergency water source from the sister reactor.

During completion of Project CG-844 it was necessary to remove this line from service to accomplish certain line modifications.

These process changes authorized removal of the HPCT line to complete necessary welding on this line. Specific operating requirements were specified in the authorizations.

PCA #2-25 - "Graphite Thermocouple Stringers, K Reactors"

Process Standard C-040 specifies the number of graphite thermocouples that must be serviceable and the time permitted before replacement after failure. Both K Reactors had one stringer less than required in PCA #1-54 due to accelerated stringer failures and delay in shield piece production.

Authorization was granted to operate with less than the required number of stringers, provided the stringer replacement schedule and other specific requirements of the PCA were followed.

PCA #2-26 - "Removal of Export Pumps at D and DR Reactors"

Provisions and conditions of this PCA are nearly identical to those specified for H Reactor in PCA #2-21, above.

PCA #2-27 - "Flux Monitor Range Switch Settings, H Reactor"

Process Standard C-030 requires that three flux monitor amplifiers read at least four major divisions on the least sensitive range under certain operating conditions.

Following startup from a water leak, two of the four flux monitors could not meet the minimum reading requirement even after the chambers had been positioned in the maximum possible flux field.

Operation was authorized with one of the three required flux monitors not meeting the minimum reading requirement, provided the minimum reading requirement be met when normal neutron flux density could be restored to the affected wet region of the graphite moderator.

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PCA #2-28 - "Water Leak, DR Reactor"

Conditions and requirements specified in this PCA are nearly identical to those described in PCA #2-14, above.

PCA #2-29 - "Ball 3X Automatic Trip Settings, KW Reactor"

Process Standard C-110 specifies the riser pressure trip settings that actuate a ball 3X drop in the event of rapid water pressure loss to the reactor. Specified trip settings are a function of the actual riser pressure. Thus different trip settings are required for five and six-pump operation.

Operation was resumed during February with five pumps on the line and ball 3X riser pressure trips somewhat more conservatively set than would be normally required for five-pump operation. Following pump repairs, the sixth pump was placed on the line. The net effect of the ball 3X water-pressure trip settings was that the riser pressure would fall somewhat further than normally specified before getting a ball 3X trip due to a ruptured riser or header. Since the difference was not considered significant, authorization was given until the next outage to operate on six pumps with ball 3X riser pressure trip settings essentially set for five-pump operation.

PCA #2-30 - "Removal of Export Pumps, D-DR Reactors"

Provisions and conditions of this PCA are nearly identical to those specified for H Reactor in PCA #2-21, above.

PCA #2-31 - "Tube Power and High Pressure Dump Limits, KER Loops"

Maximum tube power limits in Process Standards K-010 and K-040 were based on the pressure relief valve capacities of the KER loops. Higher tube powers were authorized in this PCA, provided a means for depressuring the loop through the dump valve by a loop high pressure signal was installed and accepted.

PCA #2-32 - "Crossunder Line Use, D Reactor"

Conditions and requirements of this PCA were similar to those presented above in PCA #2-13. Authorization was given to operate the crossunder line under specific requirements of PCA #2-32.

PCA #2-33 - "Crossunder Line Use, DR Reactor"

Conditions and requirements of this PCA were similar to those presented above in PCA #2-13. Authorization was given to operate the crossunder line under specific requirements of PCA #2-33.

PCA #2-34 - "Removal of Export Pumps, B-C Reactors"

Conditions and requirements of this PCA are similar to those specified in PCA #2-21, above, for H Reactor.

PCA #2-35 - "Horizontal Bowing Measurements, B, D, and F Reactors

Process Standard G-010 specifies that graphite moderator distortion be measured annually.

Newly designed traversing equipment for measuring horizontal bowing proved to have insufficient range to measure moderator distortion.

Authorization was given until April 30, 1962, to defer taking these data until further modifications can be made to the traversing equipment.

Indices - Process Standards, Reactor, HW-46000 B, and HW-46000 F

Indices for these two standards manuals were updated and issued during the month.

PROCESS ASSISTANCE

One engineer audited conformance of process standards on all Processing Operations' shifts by making 16 inspections at each reactor during the report period.

RUPTURE EXPERIENCE

<u>Failure Date</u>	<u>Tube Number</u>	<u>Lot Number</u>	<u>Type of Material</u>	<u>Exposure MWD/T</u>	<u>Type of Failure</u>
3/9/62	2378-B	UZ-060-D	I&E N	289	End
3/11/62	1078-DR	KZ-152-H	I&E N	467	Side Hot-Spot
3/12/62	1372-H	KZ-135-D	I&E N	263	End
3/12/62	3446-KW	KS-E4(1)	I&E E (0.94%)	1647	Unclassified
3/15/62	1584-DR	CZ-884-H	I&E N	486	Side Hot-Spot

Legend

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

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

End - Failure on the end of the fuel element probably caused by water penetration through a weld.

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

Unclassified - The failure did not logically fall into any of the usual types.

(1) This rupture occurred in I&E enriched non-bumper zirconium-clad coextruded material being irradiated under the authorization of PT IP-397-A. Examination will be carried out on this element in the HLO Radio-Metallurgy facilities.

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OPERATIONAL PHYSICS OPERATIONPILE PHYSICS ASSISTANCE

Initial operation with an enriched core test to reduce minimum downtime proved very successful. The measured reactivity gain with the core of 50 enriched columns in B Reactor was consistent with the calculated gain of 14 mk. Although the initial power levels utilizing the enriched core were conservatively maintained at a low level, the initial performance indicates that with experience startup efficiencies utilizing the enriched core will be little different from normal startup efficiency.

Horizontal rod sticking is being encountered at several reactors. However, in most cases, the cause of the sticking either has been corrected or the sticking has not been serious enough to keep the rods out of service; thus operating efficiency has not been significantly affected. Nuclear safety is not involved as the HCR's are not counted for safety purposes as "insertable" safety control.

Difficulties at several reactors in inserting nonpoisonous splines have delayed the program for routine flux monitoring with spline traverses. Thicker nonpoisonous splines have been ordered.

SUMMARY OF OPERATING DATA OF PHYSICS INTEREST
FOR THE MONTH OF MARCH, 1962

Reactor	B	C	D	DR	F	H	KE	KW
ECT in March (1)	1480	1650	1485	1490	1470	1530	2555	2560
12-Month Average ECT	1495	1680	1490	1485	1455	1520	2535	2545
Equil. Scram Time (2)	25-30	20-25	14-17	17-22	15-20	20-25	20-25*	25-30*
No. of Scrams and Recoveries (3)	1/1	0/0	0/0	0/0	1/1	2/2	0/0	0/0
No. of Non-Scram Outages (4)	0/0	1/1	0/0	0/0	0/0	0/0	0/0	0/0
No. of Non-Scram Outages (4)	4	1	1	3	1	3	1	3
Recording Period -								
From:	2-19	2-24	2-19	2-21	2-20	2-20	2-21	2-21
To:	3-18	3-19	3-20	3-20	3-20	3-19	3-20	3-19

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

- (1) Effective Central Tubes: This value is defined as pile power level divided by the average power of the ten most productive tubes in the reactor.
- (2) This is defined as the maximum time available in minutes between scram and first indication of startup.
- (3) The first pair of numbers shows the number of brief outages from which secondary cold startups would be made and the number of successful startups. The second pair shows the number of brief outages from which hot startups would be made and the number of successful recoveries.

- (4) The number of ordinary outages (including those initiated by scrams followed by unsuccessful recovery attempts).

B Reactor - J. R. Fredsall

The initial use of the enriched core to reduce minimum downtime was highly satisfactory. The 11-hour reduction in the minimum downtime was consistent with preliminary calculations which predicted a reactivity gain from the core of 14 mk. The 50 enriched columns would have been worth about 3 mk if scattered through the lattice. Operation with the core was no more difficult than normal; however nonequilibrium losses were about four equivalent hours greater than for normal startups as a result of a conservative approach to speed-of-control limits and initial operating techniques.

Flattening efficiency continued to be good, and a new high power level was achieved despite the four full-term outages which occurred. One subcritical monitor was out of service due to difficulties with the traversing mechanism.

C Reactor - D. W. Constable

Operation was interrupted by only one scheduled outage; the administrative power level limit was attained during several days of operation.

One more of the original cadmium-containing rods, number 6 HCR, was replaced, leaving only four of the original rods in the reactor. The replacement of the number 4 HCR, which has started to lose poison strength due to cadmium burnout, is waiting on the arrival of a half-rod which has been ordered.

D Reactor - D. G. Albertson

Continuous operation has been experienced following the two-week tube replacement outage early in the report period during which about 400 tubes were replaced. Although a very low residual exposure existed after the outage, the resulting operating reactivity loss was compensated by the large number of partial length and dummy charges replaced with regular charges as a result of the tube replacement. Operation has been limited only by bulk outlet at a new record power level.

During the outage, number 8 HCR, which had been out of service for the last few months, was replaced, and the channels for the two VSR's which had excessive drop times were broached to correct the restrictions to free fall.

DR Reactor - J. W. Hagan

The operating cycle of the central block loading was terminated at the relatively low exposure of 500 MWD/T for a tube replacement outage. The low exposure permitted several spike enriched columns charged with the former block load to be carried over for the low-exposure portion of this subsequent

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block; the net effect was to reduce the number of additional spike enriched columns for reactivity compensation from about 60 to 30.

Both subcritical monitors had insufficient sensitivity during one startup because chambers were not traversing properly into the reactor; the drive mechanisms were subsequently repaired.

Prior to the tube replacement outage which was initiated by a rupture, continuity was interrupted twice, once for a water leak and once for a rupture.

F Reactor - R. B. Heiple

Since resumption of equilibrium operation late in February after a tube replacement outage, operation was interrupted by only one outage for a water leak. The large discharge accompanying the tube replacement outage restricted reactivity to a sufficient extent to require that the CO₂ concentration be increased; thus power levels for the first two weeks after the tube replacement outage were graphite-temperature-limited.

The Flexowriter continued to perform erratically limiting control efficiency particularly during startups.

Difficulty in the scrambling of HCR's was encountered; the rods travelled in a limited distance and had to be driven in the rest of the distance under normal power; nuclear safety is not involved since horizontal rod scrambling is not assumed in the definition of immediately available control.

H Reactor - L. L. Grumme

A continuous operating period of 27 days was experienced following the return from the E-N to the natural uranium load; subsequently two water leak outages occurred. Although operating techniques had to be modified with the natural load, full control efficiency has been maintained.

Flattening efficiency has decreased slightly from the high achieved during initial operation with the natural load; this was a result of the increase in the tube powers in the central zone relative to those in the fringe as fuel in the flattened zone gained plutonium.

KE Reactor - A. R. Kosmata

Operating efficiency was excellent with only one scheduled outage; flattening efficiency continued to be high.

Although still in service two HCR's have been sticking; corrective action has not been fully successful. Insertion problems with the thinner non-poisonous splines for flux traversing resulted in only 10 successful insertions in 16 attempts.

KW Reactor - R. A. Chitwood

One of the three outages during the report period was initiated by a deliberate scram when tube temperature limits were reached in one region of the reactor about two days after startup; although the necessity for an outage has been rare, distributional control stability has been difficult to maintain following startups with high residual exposure. Operation following the subsequent outage, during which a large discharge had occurred, was stable.

One startup was made with lower helium concentration than normal. The resulting higher reactivity condition increased nonequilibrium losses and increased spline usage. Since a subsequent helium purge was necessary to maintain graphite temperatures within limits before further power increases could be made, only a small helium saving was realized.

Although no rods have been lost from service, three HCR's were sticking slightly.

PROCESS PHYSICS STUDIES

Safety Control Studies

Two startups have been carried out under PT IP-467-C at B pile in which a 50-column E-metal core permits a reduction in minimum downtime. The minimum downtime was shortened approximately 10 hours, and the production was increased by an equivalent of seven effective hours. Flux distribution control during the initial rise was easily confined to the enriched region. Following the insertion of compensating splines in the core, temperature distribution control was similar to normal startups. A production test supplement is under preparation for calibration of control rod tips through the uncompensated core. A second supplement is under preparation for initial trial of the partial-xenon-override core in a K Reactor.

A document summarizing the status of the instrument criteria study to date is in the final typing stage. This functional study points out the dependence on procedure in the use of currently conceived flux-sensitive instruments for high-level safety circuit monitoring. Continued studies are to include 11-node calculations for which analog simulation components are now being assembled. Results of the more complex geometry conditions which that study will permit will be reported at a later date along with other continuing refinements.

Pile Reactivity Studies

The N Reactor Stack Purity Test was carried out successfully on March 3 and 4 as authorized by HW-72654, PT 2. The observed diffusion length of approximately 85 cm compared favorably to the 83 cm measured in the experimental mockup which was not supplied with cross-coolant nor ball channel voids. A scalloping effect of a flux depression of about six per cent every 80 cm longitudinally decreased the sensitivity of the test slightly. The observed

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spacing corresponds to rod bank locations and is presumably associated with the additional neutron leakage through rod channels. A check on the test sensitivity was obtained by moving the count assembly past a can containing five Pb-Cd poison pieces; a reduction of approximately 13 per cent in count rate was observed with the poison several lattice units away.

Control Efficiency Studies

A test for half-splines and grey splines for reactor control is routing for signature as PITA IP-19-C. Bids have been requested for quantities of both types of splines to be used for fine flattening and front-to-rear adjustments.

Because of insertion difficulties the 20-mil flux-traverse splines will be replaced with 30 or 40-mil splines, both of which are out on bids.

Reactor Fundamentals Training

Differences in N Reactor physics parameters and the technical reasons for these differences were given in a lecture to an N Reactor operating class-in-training.

A series of five lectures on SL-1 reactor descriptions was completed during the month. The talk was given for IPD operating personnel in conjunction with one by a member of Environmental Studies, HLO, on the radiation control aspects of the SL-1 incident.

TESTING OPERATION

COOLANT TESTING OPERATION

KER Loop Operation

KER-1 - Testing of the thermocouple element and four 17-inch NIEL elements as authorized by PT IP-448-A continued. Operating conditions are 285 C, 1600 psi, and pH 10. Initial testing of the thermocouple element has been satisfactory, and the decontamination phase of the test will be initiated at the next reactor outage.

KER-2 - Testing of five 23-inch NIEL elements as authorized by PT IP-377-A was continued. Operating conditions are 210 C, 1600 psi, and pH 10. The fuel elements have reached desired exposure, and the loop will be discharged at the next reactor outage and made available for Project CGI-839 revisions.

KER-3 - Successful operational testing with the two 23-inch NAEI elements authorized by PT IP-477-A was continued. Operating conditions are 285 C maximum, 1550 psi, and pH 10. A 16-inch thermocouple element and an eleven-piece, 23-inch NAEI charge authorized by PT IP-477-A has been prepared for charging at the next reactor outage.

KER-4 - Following installation of a high pressure trip to actuate the emergency dump system, the loop was charged on March 7 with five 23-inch NAEI elements as authorized by PT IP-477-A. In-reactor recirculation was established and operational flow tests conducted prior to reactor startup on March 7. Testing conditions were 285 C maximum, 1550 psi, and pH 10.

1706-KE Single-Pass Tube Operation - All eight tubes were supplied normal process water from Building 105-KE.

Preparations for testing in SP-1 (2952-KE), SP-2 (3050-KE), SP-5 (4557-KE), and SP-6 (4863-KE) as authorized by PT IP-475-AI were completed. Each of these tubes will be supplied water from the 1706 pumps following the next reactor outage.

KE Reactor Outage Time Requirements - No unscheduled outages were charged to production testing. A total of 6.1 hours was charged to active production tests as listed below.

<u>Production Test</u>	<u>Description</u>	<u>Hours</u>
PT IP-361-A	Discharge-charge SP-7 (4963-KE) and SP-8 (5063-KE)	0.6
PT IP-477-A	Discharge-charge KER-4 and run operational tests	5.0
PT IP-477-A	Delay - Removing radioactive spacer from KER-4 rear nozzle	0.5

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Out-of-Reactor Facility Operation

TF-1 - Testing of stressed samples of AMS-5616 was completed on February 23. Piping modifications permitting larger coupon charges were completed on March 4. Testing to evaluate fatigue and stress resistance of carbon steel and stainless steel welded samples treated in the sodium bisulfate decontamination process was started on March 9. Eight cyclic decontamination processes are scheduled. The first cyclic decontamination was completed on March 18 and the second was being performed at month's end.

TF-2 - The second fretting corrosion test of Zircaloy-2 failed on March 8. The facility was not operated the remainder of the period pending development of another fretting corrosion test.

TF-3 - Corrosion testing of aluminum, stainless steel, and Zircaloy-2 coupons was completed on February 21. Minor changes in test facility instrumentation and a five-day conditioning run were completed on March 15. A third test consisting of a Zircaloy-2 covered immersion heater, coupons of 316 stainless steel, A-212 carbon steel, and Zircaloy-2 was then charged and operation resumed at 580 F, 1985 psi, and pH 10. The objectives of this test are to evaluate the cladding characteristics of Zircaloy-2 under conditions of heat transfer and the corrosion characteristics of the various metallic coupons.

TF-4 - Uniform corrosion testing of A-212 carbon steel, sensitized and non-sensitized 304 stainless steel, and Zircaloy-2 continued. Test facility operating conditions remained unchanged at 186 C, 1600 psi, and pH 10.

TF-5 - Minor leak repair on February 15 revealed a short length of thin-walled tubing (0.035 inch) in this facility. As a result of this discovery, the loop was shut down and all tubing examined and replaced where necessary, with 0.065-inch wall tubing. Corrosion testing of carbon steel, stainless steel, aluminum, and zirconium alloys was resumed on February 25. Operating conditions are 290 C, 1400 psi, and pH 7.0.

TF-6 - The test facility was shut down February 15 pending examination of tubing. Replacement of necessary tubing was completed March 23.

TF-7 - Following completion of main loop flow control valve repair and tubing and replacement examination on February 28, operation was resumed at 572 F, 1600 psi, and pH 7.0. The test objective is to evaluate the corrosion characteristics of the following materials or components while exposing them to a 400 ppm sodium nitrite concentration used as a corrosion inhibitor:

1. Suit-case-handle supports of two Zircaloy-2 clad fuel elements and two Zircaloy-2 dummies.
2. One KSE3 element.
3. Fretting corrosion testing of a PRTR fuel element.
4. Coupons of carbon steel, stainless steel, and Zircaloy-2.

TF-8 - Corrosion testing of samples of carbon steel, stainless steel, and Zircaloy-2 continued at 280 C, 1200 psi, and pH 10. Test objectives are to obtain corrosion data pertinent to the NPR primary systems.

TF-13 - Corrosion testing of carbon steel, stainless steel, and a 70-30 copper-nickel alloy was interrupted March 17 when pump-to-motor alignment problems developed. Modification and repair are in progress.

TF-15 - High temperature corrosion testing of stainless steel, Zircaloy-2 and 4, Hastelloy-X, and Alleghany Ludlum D-979 was interrupted during the report period as follows:

<u>Testing Interrupted</u> (Date)	<u>Cause of Interruption</u>	<u>Testing Resumed</u> (Date)
3-1-62	Drain valve replacement	3-3-62
3-9-62	Make-up pump repair	3-10-62
3-14-62	Make-up pump repair	3-20-62
3-23-62	Awaiting shipment of special pump parts	

Normal operating conditions are 900 F, 4800 psi, and pH 10.

COMPONENT TESTING OPERATION

Irradiated Fuel Element Examination - Examinations were completed on 38 tubes of aluminum-clad fuel elements and six tubes of zircaloy-clad fuel elements.

<u>Number of Tubes</u>	<u>Production Test</u>
12	PT-216-A, Evaluation of Performance of Normal Production I&E Fuel Elements
13	PT-263-A, Evaluation of Chemically Nickel-Plated Fuel Elements
13	PT-310-A, Determination of Dimensional Stability of Uranium Fuel Cores Classified by the Fuel Core Tester (UT-2)
6	PT-397-A, Coextruded Zircaloy-Clad Enriched I&E Fuel Elements

Process Tube Corrosion Monitoring Program - In-reactor measurements of 977 process tubes were completed. Number of tubes measured for each reactor and document numbers of the reports issued are as follows:

<u>Reactor</u>	<u>Number of Tubes Probologged</u>	<u>Report No.</u>	<u>HW Number</u>
B	83	18	72841
D	119	19	72859
F	33	20	72908
DR	53	21	72918
KE	30	22	72925
C	111	23	73036
DR	548	24	73108

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Visual examination was completed on eight process tubes as follows:

<u>Reactor</u>	<u>Number of Tubes</u>	<u>Reason Removed</u>	<u>Report No.</u>
DR	2	Leak	72887 and 73038
F	1	Leak	73071
F	2	Severe external corrosion	73071
KE	2	Routine	72797 and 73037
KW	1	Mechanical damage	Not reported

Panellit System Programs

Gages repaired, calibrated by maintenance	-	67	
Gages meeting calibration criteria	-	33	(49%)
-previous month	-		(79%)
In-board gage reliability examination	-	736	
Gages meeting examination criteria	-	732	(99%)
-previous month	-		(95%)
-average for past year	-		(93%)
Response time determination	-	46	
Gages meeting examination criteria	-	46	(100%)
-previous month	-		(100%)
-average for past year	-		(83%)
In-board Bourdon coil examination	-	5 460	
Non-leaking coils	-	5 450	(99.81%)
average rate for past two years	-		(99.56%)
Gage failures receiving failure analysis	-	64	
2B-X1 switch examination	-	800	
-rejection rate	-		(13.5%)
-previous month	-		(11.4%)

On the exchange program, 966 gages were received and examined. Results were as follows:

	<u>Model 154-100-C</u>	<u>Model 154-100-K</u>	<u>Model 156-100-H</u>
Examined	11	615	340
Rejected	3	54	38
Rejection rate	27%	6%	11%
Previous month	4%	4%	6%

Rejection rate composite this month - 7.7%
-last month - 4.5%

Twenty rows of new exchange gages (981) were installed in reactor panels. Gages removed from panels, to permit installation of new gages, and prepared

for shipment to the vendor as exchange gages totaled 788.

IRRADIATION TESTING OPERATION

DR-1 Loop

The DR-1 Gas Loop was operated continuously throughout the report period with the exception of 192 hours during reactor outages. Test conditions were maintained on the test element for 360 hours. The total time at test reference conditions is now 5285 hours, with 3596 hours at 1500 F, 139 hours at 1550 F, 183 hours at 1600 F, 141 hours at 1650 F, and 1226 hours at 1700 F. The test element was cycled three times from reference conditions to ambient temperature for a total of 41 cycles.

One of the two circulators sent to the vendor for repairs was returned.

H-1 Loop

The safety circuit trips for high coolant temperature and low loop pressure were modified to two-out-of-three coincident trip circuits as authorized by Design Change 528.

NAA-111

The irradiation of specimens of U-Mo alloys for Atomics International in the 2D test hole in KW Reactor continued at reference conditions.

HAPO-222

The four uranium swelling capsules undergoing irradiation in KW Reactor continued at reference conditions.

Borescoping Activities

VSR Channels 41 and 47, C Reactor - These channels were examined before and after broaching to determine the effectiveness of broaching. Some graphite was chipped away from protruding blocks and one tube channel was exposed in VSR 41. Channel 47 has severe graphite burnout in the ends of the filler blocks and in all blocks from 37 feet to 40 feet.

HCR Channel No. 2, KE Reactor - This channel was examined to determine the cause of galling on the rod. The rod rubs the bottom of the channel in the first graphite block and the top of the channel 3 1/2 feet further in.

Process Channels 2994, 4294, 4371, and 3048, KE Reactor - These channels were examined for obstructions in the channels which would slow down rod entry. No obstructions were noted, but the step plugs were all badly scored.

Graphite Thermocouple Stringer Channels 5 and 9, KE Reactor - These channels were examined several times to assist in removal and replacement of the

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thermocouple trains.

Sample Irradiations - The following irradiation samples were handled:

Reactor	Hole	Facility	Request No.	No. of Samples	Material-Purpose
C		Process Channel	HAPO-098	25	Graphite (burnout study)
C	Y	Hot Graphite	HAPO-177	10	Graphite (radiation damage study)
KW	2C	Hot Graphite	HAPO-177	9	Graphite (radiation damage study)
KE	2D	Quickie	HAPO-184	10	Washington-Designated program
F	E	Quickie	HAPO-262	2	Rhodium-vanadium (radioactive buildup and decay of H-1 Loop material)
F	E	Quickie	HAPO-223	9	Cobalt (flux monitor)
F	E	Quickie	HAPO-223	4	Graphite (radioactive buildup and decay of possible tube replacement lubricant)
KW	4B	Snout	HAPO-243	1	Reactor structural materials (fission damage study)
KE	2D	Quickie	HAPO-256	2	Plutonium (fission yields of heavy plutonium isotopes)
DR-H		PCCF	HAPO-254	6	Effluent water (activation analysis study)
KE	2D	Quickie	HAPO-252	1	Arsenic (tracer isotope production)
KE	2A	General Purpose	HAPO-245	1	Zirconium (hydride corrosion capsule)
C	Y	Beam Hole	HAPO-223	6	Foil irradiation (calibration of experimental spline test facility)
		*Gamma	HAPO-171	4	Plastics and rubber (radiation damage study)
		*Gamma		3	Concrete (radiation damage study)

*Gamma Irradiation Facility is located in Building 105-KE storage basin.

Vertical Bowing Measurements - Following is a summary of vertical bowing measurements. All distances are measured from the inlet flange.

Tube No. 4574-B	Up .06 inch at 9 feet in 3 months
	Down .05 inch at 19 feet in 3 months
Tube 1574-F	No previous data for comparison.

J. H. Brown
for Manager, Research and Engineering

2-10-1964

1-10-1964

1-10-1964

MANUFACTURING

PRODUCTION OPERATION

PRODUCTION SCHEDULING

There were no discharge goal exposure adjustments during March. The exposure of regular material is down slightly to permit blending with April discharges which are expected to be slightly above the target exposure.

Discharge Exposure Comparison (MWD/T)

	<u>Regular Uranium</u>		<u>Enriched Uranium</u>		<u>Aggregate Exposure</u>
	<u>6 Old</u>	<u>2 K's</u>	<u>6 Old</u>	<u>2 K's</u>	
January	666	676	835	759	695
February	683	652	842	755	710
March	674	640	976	746	697

Rail and truck shipments of Essential Materials were as follows:

Carload shipments for IPD	-	234
Carload shipments for other Depts.	-	167
Truck shipments for IPD	-	<u>144</u>
Total		545

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MONTH		REACTOR OPERATION STATISTICS — PROCESSING																					
March, 1962		B	C	D	DR	F	H	SIX OLD	KE	KW	K'S	TOTAL											
INPUT PU (% OF FORECAST)		128.9	102.4	103.9	50.9	188.0	132.1	112.8	101.5	111.1	106.4	109.6											
TIME OPER EFF. (% OVERALL)		82.9	63.9	64.9	35.7	88.1	81.5	69.5	78.4	90.5	84.4	73.2											
NEW TUBES INSTALLED		3	119	402	218	3	4	749	4	0	4	753											
WATER LEAKS - TUBE		2	0	0	1	1	3	7	0	0	0	7											
- VAN STONE		1	0	0	1	0	2	4	0	0	0	4											
SLUG RUPTURES		1	0		2		2	5	1	1	2	7											
HELIUM CONSUMED -M CU.FT.		530.0	659.7	414.1	147.2	548.1	194.0		138.4	291.3		2922.8											
CAUSES OF REACTOR OUTAGES		NUMBER OF REACTOR OUTAGES AND HOURS																					
SCRAMS	NO.	HRS.	NO.	HRS.	NO.	HRS.	NO.	HRS.	NO.	HRS.	NO.	HRS.	NO.	HRS.	NO.	HRS.	NO.	HRS.	NO.	HRS.	NO.	HRS.	
CHARGE - DISCHARGE								1	43.1			1	43.1	1	77.4			1	77.4	2	20.5		
RUPTURE		1	57.5				2	44.5		2	85.9	5	187.9	1	83.3	1	34.6	2	117.9	7	305.8		
WATER LEAK		2	50.5	1	75.9		1	44.0	1	42.9	2	49.2	7	262.5						7	262.5		
TUBE REPLACEMENT				1	192.1	(1)	261.0	(2)	389.8			1	2.0	2	844.9					2	844.9		
MAINTENANCE,		1	19.2										1	19.2						1	19.2		
TOTAL		4	127.2	3	268.3	-	261.0	3	478.3	3	88.7	7	137.7	20	1361.2	2	160.7	2	70.7	4	231.4	24	1592.6
UTILIZATION OF REACTOR OUTAGE HOURS																						TOTAL HOURS	% OF TIME
CHARGE - DISCHARGE		33.0	53.1	32.0	75.2	28.6	23.5	245.4	80.2	36.1	116.3	361.7	6.1										
RUPTURE REMOVAL		1.8			9.7		29.5	41.0	1.2		1.2	42.2	0.7										
WATER LEAK		43.5	26.2		19.6	5.8	51.2	146.3				146.3	2.5										
TUBE REPLACEMENT			140.0	201.9	309.5	12.8	2.0	666.2	23.0		23.0	689.2	11.6										
MAINTENANCE		25.2	36.6	21.0	29.0	39.8	18.4	170.0	18.0	3.0	21.0	191.0	3.2										
STANDARD CHECK		2.7	.4		4.6		5.3	13.0	2.3	1.0	3.3	16.3	0.3										
PRODUCTION TEST		21.0	4.2	1.0	9.1	1.7	7.2	44.2	36.0	(3)	22.4	58.4	102.6	1.7									
PROJECT WORK			7.5	2.0				9.5		3.7	3.7	13.2	0.2										
OTHER			0.3	3.1	21.6		0.6	25.6		4.5	4.5	30.1	0.5										
TOTAL		127.2	268.3	261.0	478.3	88.7	137.7	1361.2	160.7	70.7	231.4	1592.6	26.8										

- (1) Continuation of February tube replacement outage.
 (2) Tube replacement following rupture removal.
 (3) Includes 9.6 hrs. for removal of a Production Test rupture.

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[illegible]

*REMOVAL METHOD: Q, -QUICKIE; CM-CHARGE MACHINE; HJ-HYDRAULIC JACK; TP-TUBE & PIECE

MONTH March, 1962		REACTOR OPERATIONS STATISTICS — POWER								SHEET 1
		100-B	100-C	100-D	100-DR	100-F	100-H	100-KE	100-KW	TOTAL
RIVER WATER (BLDG. 181)										
TO RESERVOIR (BLDG. 182)	GPM AVG.	11844		1650		1878	2548			17920
TO FILTER PLANT (BLDG. 183)	GPM AVG.	68378		66972		87803	80200	179809	181677	664842
TO FILTER PLANT (C&DR)	GPM AVG.	102711		38314						141025
TO R & E (KER) & FEO	GPM AVG.			203				440		643
TOTAL	GPM AVG.	182933		107142		89681	82748	180249	181677	824430
TOTAL	M GAL.	7375.9		4320.0		3615.9	3336.4	7267.6	7325.2	33241.0
RESERVOIR WATER (BLDG. 182)										
TO POWER HOUSE (BLDG. 184)	GPM AVG.	167		80		363	69			679
TO COND. SYSTEM (BLDG. 190)	GPM AVG.			683		1413	2479			4575
TO COND. SYSTEM (190DR & 183F)	GPM AVG.			887		102				989
TO EXPORT SYSTEM (INCL. NPR)	GPM AVG.	11677								11677
TOTAL	M GAL.	477.6		66.5		75.7	102.7			722.5
FILTER WATER (BLDG. 183)										
TO POWER HOUSE (BLDG. 184)	GPM AVG.	180		200		118	149			647
TO PROCESS (BLDG. 190)	GPM AVG.	79429	78039	48292	45392	81088	73400	175364	177165	758169
TO 108	GPM AVG.	2500	4500	4040		1022	1190			13252
TO 108DR	GPM AVG.			4040						4040
TO FILTER PLANT (BLDG. 183DR) & B	GPM AVG.		15967	8065						24032
TO F & S SYSTEM	GPM AVG.	98		231		220	130		50	729
TO R & E (KER) & FEO	GPM AVG.			153				201		354
BACKWASH	GPM AVG.	2138	4205	1954	987	5355	5331	4244	4462	28676
TOTAL	M GAL.	3400.8	4141.3	2700.4	1870.0	3540.2	3233.7	7249.9	7325.2	33461.5
PROCESS WATER (BLDG. 190)										
TO REACTOR	GPM AVG.	79029	77639	47892	44992	80708	72900	169100	170100	742360
TO REACTOR	GPM NOR.	88200	101200	87000	87000	88200	84600	188000	186800	911000
POWER HOUSE (K AREA)	GPM AVG.							18	13	31
108 (KE - KW)	GPM AVG.							5846	6652	12498
TO R & E (KER)	GPM AVG.									
BUILDING USAGE	GPM AVG.	400	400	400	400	380	500	400	400	3280
TOTAL	M GAL.	3202.6	3146.5	1947.1	1830.2	3269.5	2959.5	7070.6	7143.3	30569.3
RIVER DATA										
ELEVATION (MSL, FT.)	(MAX.)	386.5		382.3		368.4	373.5		381.1	
	(MIN.)	384.4		377.6		364.0	369.0		379.2	
	(AVG.)	384.9		378.0		364.6	370.3		379.9	
TEMPERATURE	AVG. °F	37.1		42.1		42.1	42.1		38.8	

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MONTH March, 1962		REACTOR OPERATIONS STATISTICS — POWER								SHEET 2
		100-B	100-C	100-D	100-DR	100-F	100-H	100-KE	100-KW	TOTAL
<u>WATER TREATMENT DATA</u>										
AT BLDG. 182	MM GALS									
BLDG. 183	MM GALS	2757.0	4141.3	2700.4	1544.8	3540.2	3233.7	7249.9	7325.2	32492.5
<u>CHEMICAL CONSUMPTION</u>										
CHLORINE (BLDG. 182)	LBS.									
(BLDG. 183)	LBS	5935	12385	4510	1860	14828	19225	97368	141069	297180
	AVG PPM	0.3	0.4	0.2	0.1	0.5	0.7	1.6	2.3	1.1
ALUMINIA	LBS	103133	154974	78596	52965	126945	119800			636413
ALUM	LBS	328	0	90870	20730	25073	1595	640431	828915	1607942
	AVG PPM	*18.0	*18.0	*18.0	*18.1	*18.1	*17.8	10.6	13.6	15.3
SEPARAN	LBS	350	450	550	274	600	850	2178	3940	9193
	AVG PPM	.015	.013	.024	.021	.020	.032	.036	.065	.034
SULPHURIC ACID (A3 100%)	LBS	289603	387244	284368	164221	495737	333141	1446240	1816554	5217108
	AVG PPM	12.6	11.2	12.6	12.8	16.8	12.4	23.9	29.8	19.3
DICHROMATE	LBS	26543	36245	16100	15062	27079	24055	105680	114896	365660
<u>PURGE MATERIAL CONSUMPTION</u>									FILTER AIDS	
SOLIDS	LBS	2350	9000	0	0	0	0	0	600	11950

*Alumina & Alum combined for PPM avg. in Alum Column.

MONTH March, 1962		REACTOR OPERATIONS STATISTICS — POWER							SHEET 3
ANALYTICAL DATA		100-B	100-C	100-D	100-DR	100-F	100-H	100-KE	100-KW
RAW WATER									
PH	PH AVG	8.00	8.00	8.11	8.11	8.12	8.04	7.38	7.34
TURBIDITY	PPM AVG	11	11	16	8	13	14	18	17
FINISHED WATER									
PH	PH AVG	7.00	7.00	7.03	6.95	6.92	7.00	6.60	6.60
TURBIDITY	PPM AVG	.004	.005	.003	.003	.004	.002	.004	.004
Cl ₂ RESIDUAL	PPM AVG	.05	0.5	TRACE	TRACE	.06	.14	.18	18
DICHROMATE	PPM AVG	1.00	1.39	.99	.99	.99	1.00	1.86	2.01
STEAM DATA		100-B	100-D	100-F	100-H	B-D-F-H TOTAL	KE	KW	KE-KW TOTAL
GENERATED (MAX)	LBS/HR	109000	154000	88000	89000	444000	36500	35000	71500
(NOR)	LBS/HR	81000	81000	60000	59300	281300			
(AVG)	LBS/HR	90300	100982	58870	56574	306726	33400	32600	66000
TOTAL	M LBS	60713	67860	39562	35302	203437	21520	21852	43372
TO PLANT	M LBS	51485	57545	34815	29936	173781	19368	19667	39035
COAL RECEIVED	TONS	2525	2717	3648	2152	11042			
CONSUMED	TONS	3694	4226	2725	2065	12710			
IN STORAGE	TONS	13594	14323	2997	6910	37824			
GEN.STEAM/LB.OF COAL		8.22	8.03	7.26	8.55	8.00			
OIL RECEIVED	GALLONS						136551	321598	458149
CONSUMED	GALLONS						195509	181086	376595
IN STORAGE	GALLONS						1375622	1443344	2818966
GEN.STEAM/GAL.OF OIL							110.1	120.7	115.2
ELECTRICAL DATA									
TOTAL GENERATED KW HRS.							1349600	1408600	2758200
Peak Demand Control							0	0	0

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B-C REACTOR OPERATION

A new boron carbide horizontal control rod was installed in No. 6 channel at C Reactor to replace the old cadmium rod which had lost its poison strength through burnout.

Vertical safety rod channel No. 41 at C Reactor was broached to remove the protruding portion of a tube bearing block. The broaching operation failed to remove the distortion sufficiently to permit the installation of a C-type rod; hence the B-type rod was reinstalled and found to operate satisfactorily.

The programmed installation of retaining bands on the rear face nozzle elbows and connectors at C Reactor was completed.

The shaft of the No. 10-B pumping unit at the 181-B River Pump House sheared at the first coupling on March 26, 1962. Repair work is in progress.

The installation of 13 additional bumper nozzles at B Reactor brought the total installed to 957, 54 per cent of the ultimate total.

The provisions of Production Test IP-467-C, (HW-71809), "Reducing Minimum Downtime" were successfully utilized during two reactor start-ups to facilitate earlier resumption of operation.

Rear face dose rates at both B and C Reactors have increased up to 200 mr/hr. four hours after shutdown. The seasonal increase in manganese concentration in river water is the cause of these dose rates.

D-DR REACTOR OPERATION

The outage at D Reactor, begun on February 23 for tube replacement, was concluded on March 11. DR Reactor was shut down from March 15 to month's end primarily for tube replacement and block discharge. Rupture of a slug caused this outage to begin approximately a day and a half earlier than scheduled.

The installation of Inconel rear face pigtails is 44 and 48 per cent complete at D and DR Reactors, respectively. Bumper nozzles have been installed on 50 per cent of the DR Reactor process tubes. Replacement of rear face thermocouples at D Reactor remained at 56 per cent complete.

At D Reactor, No. 8 horizontal rod was replaced to correct binding caused by warpage; also, 15 of 38 defective resistance temperature detectors were replaced in the Zone Temperature Monitor System. Discovery of frozen cadmium nuts on the rear face thermocouple assemblies at DR Reactor has led to use of stainless steel nuts. The freezing is apparently caused by decontaminating agents.

Inspection of No. 7 process water pump at Building 190-DR revealed cracks in the first stage impeller which will necessitate replacing the impeller.

Beneficial use of the rear face crossunder piping system (Project CG-884) was achieved at D Reactor.

A system was placed in use which provides increased flow of agents for decontaminating the DR Reactor rear face. This system makes use of the existing hot water recirculation pump. Modifications to improve the operation of the dew cell moisture monitoring facilities at DR Reactor were completed.

F REACTOR OPERATION

Production was the second highest month on record. Operation was interrupted once for scheduled charge-discharge, once for the correction of a water leak and once by a scram.

Five filter backwash valves in the 183 Building failed requiring replacement of four valve gates and one backwash valve body. Replacements were made without affecting reactor operation.

Program replacements included the installation of the eleventh rear face thermocouple bundle and 48 rear face water connectors. In addition, three process tubes were replaced (two due to severe external corrosion and one due to a water leak) and 24 rear face thermocouples were repaired.

Replacement of steel railings, gates, and floor grating on C Platform with aluminum material to reduce the total weight, was essentially completed on March 16.

H REACTOR OPERATION

Operation was interrupted by two outages for ruptured slug removal, two water leak outages and two start-up Panellit scrams. A scheduled tube replacement outage was in progress at month's end.

During the outages initiated by water leak indications, three process tubes were found to be leaking and were replaced. One additional process tube with a rear Van Stone leak was replaced during a rupture outage.

To reduce the leak potential of process tubes scheduled for replacement, the charges of 37 tubes were displaced to the rear, 11 tubes were charged with less than the normal number of fuel elements and one was charged with B-metal.

The program of Inconel nozzle-to-crossheader connector replacement on the rear face was brought to 96 per cent of completion with the replacement of 24 J-2 type and ten stainless steel connectors.

Replacement of the steam supply line to the purge tank in the 190 Building with a line of greater capacity permitted a temperature increase of the

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decontamination solution. This resulted in more effective decontamination of reactor facilities prior to the extended tube outage.

New cast steel lug rings were installed on 165 front face nozzles, bringing the replacement program to 75 per cent of completion.

KE-KW REACTOR OPERATION

A combined monthly production record for the K Reactors was achieved, exceeding the November, 1961 record by 6 per cent.

The No. 3 discharge check valve at 165-KE referred to in January's report was dismantled, reassembled and returned to service during the scheduled outage at KE Reactor. Inspection revealed no conditions that could reasonably be expected to cause a malfunction in the future.

The installation of front adjustment gauges under the Panellit system modification program is 45 and 40 per cent complete at KE and KW Reactors, respectively.

The new low lift pump of higher capacity and a final design impeller under Project CGI-883 were installed in No. 5 pump unit at 190-KE. A total of five units has been installed to date in the planned replacement program.

A vertical safety rod drop-time panel was installed at KW Reactor to check rod insertion times immediately after a scram or planned shutdown. Previous drop-time checks required tripping and timing of individual rods. The new method will provide simultaneous drop-time data of all vertical safety rods.

APPLIED REACTOR ENGINEERING OPERATION

MAINTENANCE PRACTICES OPERATION

The fabrication of 2,000 rear face Inconel pigtails is on schedule. Initial pigtail delivery is forecast for April 1962.

The purchase requisition for the K Reactor aluminum tubes requests delivery of 600 tubes per month, starting September 1, 1962. A requisition for K zirconium tubes has been placed and is now in the hands of AEC-HOO.

A volume containing Equipment Maintenance Standards on six different reactor equipment systems has been submitted for review and acceptance.

PLANT EQUIPMENT ENGINEERING OPERATION

Five C Reactor inlet connectors were inspected after about three months service. Flare sizes were normal and there were no defects evident in the nuts and ferrules. An interim report (HW-72715) was issued covering investigations to date.

A general review of the process tube problem was completed and issued in document HW-72656 in response to an AEC request for a quarterly report on the subject.

SPECIAL OUTAGES SERVICES OPERATION

During the DR Reactor tube replacement outage a total of 17 splitters was lost out of 150 splitting attempts. The loss was due to breakage of the splitter blades, sticking of the entire splitter, or a combination of both. All process tube splitters were removed from service and X-rayed, eight were rejected because of microscopic cracks.

At DR Reactor, 80 tubes were bored in lieu of broaching using the boring machine designed and built by Mechanical Development Operation. After tube insertion in bored channels 13 per cent of the tubes failed the probe check and required retubing. During the same outage, 52 tubes were installed using the standard broach technique. Six per cent of these were rejected by the probe check.

The tube replacement rate at D Reactor was 0.54 hour of Special Outages Services' time per tube on a 402-tube outage. At C Reactor the replacement rate was 0.65 hour/tube on a 119-tube outage. A total of 521 tubes was replaced during the period February 23 through March 23 for a total of 1,666 tubes replaced since January 1, 1962.

At D Reactor a total of 419 tubing attempts was required to retube 402 channels and at C Reactor 121 attempts to retube 119 channels. The reasons for channels requiring more than one tubing attempt are as follows:

Probe rejects	5
Mandrel or broach failure	2
Short tubes	2
Reject due to trimmer damage	7
Rough gunbarrel	<u>3</u>
	17

OC Schroeder

Manager - Manufacturing

OC Schroeder:DLD:bam

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FACILITIES ENGINEERING

REACTOR MODIFICATION DESIGN

Pending resolution of the tube replacement program for the 100-K Reactors, preliminary design effort is proceeding on a number of components of the revised process tube assemblies and appurtenances.

Arrangements have been completed to obtain 128 excess unmachined pieces of N Reactor graphite for use in the prototype VSR sleeve installation at C Reactor. This graphite will be used for fabrication of test sleeves in the initial in-reactor test installation planned for later this year. Efforts were made at C Reactor to broach VSR channel #41. The broaching accomplished decreased rod insertion time on the channel from 2.41 seconds to 2.22 seconds, but the overall results are not considered as successful as previous broaching efforts on other channels. In the efforts to straighten the channel graphite was removed from the tube block of process channel #4092 by the broaching operation to expose a portion of tube wall to the VSR channel. This process tube channel will be used in the future for graphite oxidation studies to avoid any possible hazard resulting from tube damage due to VSR impact.

A prototype rear nozzle elbow and replacement connector have been installed on the rear face of C Reactor for test purposes. These prototypes are replacements for the presently installed configurations which are one of the major sources of the severe water leaks currently encountered on the rear face of this reactor. No operating difficulties have been encountered with this prototype during the first operating cycle.

The detailed design drawings and related purchase specifications for renovation of the existing poison column control system at B Reactor have been completed.

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EQUIPMENT DEVELOPMENT

Tube Replacement

A prototype graphite drill for channel reconditioning embodying front graphite removal, one-piece drill shaft, and work-platform mounting was used at DR Reactor on March 20 and 21 to drill about 80 channels. Operating time cycles of five to ten minutes were established. The drill bit was a carbide-tipped shell end mill. Drilling was performed front-to-rear.

VSR Channel Rehabilitation

Parts for the tooling test mockup have been fabricated. This is a mockup of pertinent parts of the top shield and graphite stack which is to be installed in the 195-D test tower for testing the tools that are being designed to enlarge the openings in the shield, and to enlarge and recondition the rod channels for the reception of liners. The first tools scheduled for testing are those that have been designed for removing debris from the channel and ball exit piping.

The shield boring machinery is completely designed and partially fabricated. The boring head portion of the machine is completed and has been tested functionally insofar as it can be tested without the drive unit. Two different types of graphite cutting tools are being debugged.

Reactor Gas System

The gradual deterioration of gas seals has led to increasing helium consumption and occasional in-leakage of air. The locations of many of these seals are too awkward to repair without such a major overhaul as the reactor modification program.

A method of operating that will permit low helium losses without seal correction appears possible. Equipment for the system that permits such a method of operating is being tested or procured.

NPR Rupture Detection

Rupture detection instrumentation of the type that will be used in NPR has been installed for testing purposes on the KER loops and is now in operation on two of them.

NPR Design Test

A total of 623 hours were expended on design test service to NPR.

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PLANT ENGINEERING

DRAFTING

Services provided during the month:

New and revised drawings	201
Layouts and sketches	103
Microfilm prints reproduced	496
Microfilm drawings added	1310
Microfilm drawings voided	719
Ozolid check prints reproduced	1396
Catalogs added to files	47
Customers serviced - Microfilm files	282
Customers serviced - Catalog files	52
BPF's and Specifications added to files	8

EQUIPMENT APPLICATION ENGINEERING

Riser Failure 105-D Reactor

A previously repaired section of the near rear riser at 105-D was inspected when leaking was reported. After cleanup localized extensive cracking was found in the vicinity of the previously repaired area. The failure was attributed to stress corrosion cracking brought about by water deposited salts from a leaking weld and the high stress level aggravated by a structural support. A contoured patch plate was welded over the entire cracked area. The salt encrusted area below the riser support was cleaned and dye-checked. No additional evidence of cracking was detected.

Ball 3X Test of Prototypic Hose Handling Equipment

A prototypic model of proposed hose handling equipment for the Ball 3X Vacuum Recovery Systems at the older reactors was tested at 105-D Reactor. Four feet of balls were simultaneously removed from each of two vertical safety rod channels in a lapsed time of under four minutes. Currently work is progressing on a number of minor mechanical modifications needed to improve the reliability and efficiency of the mechanism.

REACTOR, PLANT ENGINEERING

Fixed Radiation Monitoring

The engineering concept and study report on Fixed Radiation Monitoring HW-72131, has been issued. Authorization for initiating a Project Proposal has been provided. The current concept of this project includes complete renovation of existing fixed radiation monitoring equipment at 30 locations in a typical 105 building. In addition, new alarms consistent with current HAPO Standards and the long-range planning concepts of HW-70700, "Serious Radiation Event - Hanford Capabilities", are included.

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High-Speed Scanning Temperature Monitor - 105-KW Reactor

A high-speed scanning type temperature monitoring system was conceptually designed and a report issued. Justification for KW Reactor was made on the basis of: Improved Nuclear Safety, Future Application Potention, Present Equipment Replacement Needs, Reactor Research Control Tool, and Incidental Production Efficiency Increases.

WATER PLANT & UTILITIES ENGINEERING

Bus Separation Relaying - 100-K

Document HW-72729 was issued, outlining a proposal for revising the emergency bus separation scheme in order to minimize unnecessary outages from transient voltage dips associated with Bonneville Power Administration system faults. The proposal is aimed at avoiding shutdown of pump equipment if the BPA recovers from the initiating transient.

105-C Effluent System

The 105-C effluent system was studied for the purpose of establishing a long-range maintenance program to restore the system to first-class condition. The expansion box sliding joints and the Dresser coupling gaskets inspected to date indicate a need for new packing at the expansion boxes and also new gaskets at the Dresser coupling. A program and schedule covering these repairs was provided.

183-DR Automatic Filter Backwash

The conceptual engineering report for an automatic filter backwash system at 183-DR has been completed. This system proposes centralization of the filter control function in the 183 head house. In addition to serving as a trial step toward increased automation of the water plants, the automatic backwash system provides potential manpower savings.

4500 HP Motors

In the 4500 HP stator rewinding program, the last of the 32 stators to be rewound with modified Class A windings has been returned to HAPO and is awaiting installation. In addition to these units, eight were previously rewound with a Class B winding.

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PROJECT ENGINEERING

CG-706 - Improved Gas Instrumentation (Accrual Account)

The 105-C installation of proportionating gas composition control instrumentation was completed on March 16, 1962, and is functioning very satisfactorily. It is planned to complete a minimum of 30 days' test and evaluation prior to committing funds for like equipment for 105-B, D, DR, F, and H Buildings.

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

The design criteria and scope drawings for Phase II of this project, the two-out-of-three trip safety circuit system, have been approved by the AEC. Preparation of detailed design is proceeding on schedule.

CGI-844 - 100-K Area Coolant Backup

Piping work in the 190 and 165-KE and KW Buildings is now essentially finished. Work on the 182-K pump house is on schedule. The contractor is working on the diesel engine installation in preparation for testing early in April. The 36-inch high pressure pipeline has been successfully hydrostatically tested. Preparation for final tie-in and dual area shutdown is on schedule.

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

The project was completed with exceptions as of March 26, 1962.

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

During this period, high lift pump No. 1, 180-KE, was modified in accordance with the step 3 volute revision, and a new pumping unit was installed in the No. 1 low lift position. Installation of No. 5 high and low lift pumps, 190-KE, was started March 28. At the 181-KE and KW river pump house, preparations are now complete to allow for the installation of three submersible type pumps in each area, two of which are promised to be shipped by the vendor early in April.

CGI-889 - Effluent System Modifications, 100-B/C

Work was completed to a point where the project is ready for final testing. Testing cannot proceed, however, until a leak is repaired in the existing B Area effluent pipeline. This repair is scheduled during the next B Area outage. Directive from the AEC must be revised to authorize completion date of May 31, 1962, as requested in Revision No. 1 of the project proposal.

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CGI-905 - Interim Modifications for Improved Coolant Backup, B, C, D, DR, F, and H Reactors

The design criteria and related scope drawings for this project have been approved by the Design Council and forwarded for AEC approval. The preparation of detailed design is proceeding on schedule.

Pipe fabrication is under way for the automatic operation of the 282-E and W export line valves. Drawings are now available for the high tank flush lines in the 100 Areas. Pipe is being placed on order.

CGI-933 - Water Treatment Pilot Plant - 100-K Area

1705 Building - The structure is complete with the exception of the built up roofing. The flocculator tank has been installed and the inlet and outlet piping is being installed.

1706 Building - The filter bottoms have been rebuilt; the new 8-inch service water line is in from 165 to 1706, but is not connected at either terminus. Plans are under way for the acid flush of the existing 8-inch filtered water lines.

CGI-939 - Analog to Digital Converter System for Temperature Monitoring, B, C, D, DR, F, and H Reactors

Negotiations with the vendor for the converter were held January 30, 1962. The order has not yet been accepted by the vendor.

MJA-21, 25, 29 - Pressure Monitor Modification and Repair, 105-C, KE-KW, and H Buildings

	<u>C</u>	<u>KE</u>	<u>KW</u>	<u>H</u>	<u>Total</u>
Gages installed this period:	186	404	290	178	1,058
Gages installed to date:	1,360	1,491	1,261	1,043	5,155

7,692 switches have been received to date and 6,610 have been accepted.

CPFF CONSTRUCTION SERVICE CONTRACTOR-LIAISON

Issued 9 new work orders and supplemented 10 old jobs for a total of \$375,442 to J. A. Jones Construction Company.

PLANT FORCES WORK REVIEW

The Labor Standards Board approved two jobs for assignment to plant forces, which are estimated to cost \$3,398.

Manager, Facilities Engineering

RT Jessen:dgm

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NPR PROJECT

PROCESS DESIGN OPERATION

Research and Development

An IBM 7090 program has been completed for primary loop transients which would result from a rapid primary loop depressurization. This program is a simplified version of previous programming attempts to investigate these transients. It is possible, however, to handle 16 combinations of break location and size in five different parts of the loop. Loop depressurization has been calculated as far out in time as 5000 seconds (1.4 hours) from the time the rupture is initiated. Previous hand calculations were limited to 150 to 300 seconds. Although the data have not been fully analyzed, it is believed that the program will provide the required information for a sound basis for designing the closing controls on the room vents in 105 and 109-N.

A review of secondary cooling system transient response using HLO analog equipment has been completed. The system model employed in the simulation consisted of one steam generator, two dump condensers, two butterfly valves, two condensate pumps, a surge tank and standpipe and five boiler feed pumps. Three reports are now in preparation; analog equations and circuits, scram transient results and small disturbance results.

Conversion

Engineering studies were requested to estimate the fuel exposure level in Phase III at which annual fuel costs assuming throw-away would be equal to annual costs at 10,000 MWD/T with reprocessing. The costs were computed using the current published uranium and plutonium buy-back price schedules, a use charge of 4.75 per cent and a 4.0 per cent interest rate. At about 12,000 MWD/T the calculated throw-away fuel costs were equal to the 10,000 MWD/T reprocessing fuel costs.

Project CAI-816

109-N Mixing Header

By letter of March 9, 1962, Burns and Roe submitted for review, Drawing 3962, which outlined the proposed piping schematic for eliminating the elaborate mixing header network in the 109-N Building pipe gallery. A review has been made of Burns and Roe's proposal and it appears feasible that the mixing header can be eliminated provided the original scope functions are still met; there are advantages of the original mixing type header, but in view of the reported \$250,000 saving the retention of the mixing type header could not be justified. Project Representatives Minutes No. 63, which recommended the elimination of the mixing header, were prepared and submitted to the Design Council for tentative approval pending the receipt of a detailed analysis of this change by Burns and Roe. The Design Council accepted these minutes on March 22, 1962.

Project CAI-816 (Continued)

Metal Handling Equipment

All equipment for the underwater metal sorting machine has been installed in the test tank and aligned with other components at the AMF facilities at Greenwich, Connecticut. As soon as stainless steel shafts are received from the hydraulic cylinder vendor they will be installed in place of the existing carbon steel shafts which were erroneously installed by the cylinder vendor. This shaft replacement and other rework on manufactured items has delayed the test program considerably.

Charging Machine

Tests to determine charging machine rates were run in the 300 Area. A machine rate in excess of 25 tubes per hour was achieved. A magazine load of fuel elements and spacers has been charged through a dummy nozzle and into another magazine without damage to the fuel elements. A remote electrical control panel has been ordered to be used in conjunction with the magazine loading operation.

Primary Coolant Pumps

Cold performance tests of the first primary coolant pump have been run at 2900 rpm and at 3600 rpm. At 3600 rpm the driver end backup seal, outboard of the mechanical seal, rubbed severely after a few minutes operation. The seal design was modified to increase both axial and radial clearances. The pump was tested at 3600 rpm with the modified seal. Preliminary calculation of the data indicated the pump meets the specified performance in regard to head, flow, efficiency and minimum net positive suction head.

Horizontal Rod Drives

During the month rod tests on the horizontal rod drives have continued both in the fabricator's plant, and in the 189-D laboratory. The problems encountered earlier with the rod seals appear by the testing to have been resolved. The solid Teflon backing piece for the Teflon chevron rings has been replaced by a vented bronze backing piece. Considerable effort has been expended on the review and approval of drawings and procedures from the vendor and his subsuppliers.

Venturis

Two problems have delayed fabrication of the flow monitor venturis. The design proposed by the vendor for the attachment of stainless steel throat inserts was not suitable for the heat treatment of the completely fabricated connector as proposed by HUICO. Tests conducted by General Electric demonstrated that a simple pinning procedure for the throat inserts would permit the high temperature stress relief. The vendor has not accepted the General Electric proposal for pinning and has proposed alternate schemes. In addition, the forged body of the venturi failed to meet the magnetic particle inspection due to extensive inclusions in the carbon steel. The

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Project CAI-816 (Continued)

vendor, BIF, apparently passed on the magnetic particle requirements to the forging vendor, however, it is questionable whether the forging vendor passed this information on to the steel supplier. In a final effort to resolve the above two problems, General Electric, Kaiser Engineers, and Commission representatives visited the BIF plant, however, the problems are still not fully resolved.

100-N Administration Building

Studies are now in progress to determine the modifications necessary to TC-1100 to provide a more permanent type administration building.

DEVELOPMENT AND TESTING

At the end of March, 1962, development and testing was 95 per cent complete, on schedule.

The final report was issued, thus completing Design Test 1060, Evaluation of Strip Chart Recorder.

Full-flow throttling tests were completed for the process tube inlet valve prototype in the full-tube mockup. Significant results of the tests include the following: discrete valve positions were maintained from 20 per cent to 100 per cent lift (full open) without use of the lock-stop for flows in excess of 250 gpm; throttling did not disturb appreciably the differential pressure output of the venturi which is located only ten pipe diameters downstream; no cavitation or vibration was evident at the maximum throttling condition of 20 per cent lift and 250 gpm; the flow monitor sensing lines provided adequate pulsation suppression without the use of dampeners; and the process tube pressure drop was less than predicted by calculations. Further long-term testing of the inlet valve has been scheduled.

The current series of fuel spacer tests has been completed. Tests which were performed approximately one year ago on a fuel spacer design indicated serious rattling of spacers and resultant tube damage. The new design has been stable through cold and hot flow tests as measured by sound and mechanical vibration detectors. Borescopic traverses of the process tube have not revealed evidence of tube marking caused by spacer movement. Long-term effects of fuel spacers in the process tube have been scheduled for surveillance.

The production ball hopper mechanism is being tested at 189-D Building. Trouble has been encountered in consistently opening the gate a full three inches when actuated. In each case, the hopper gate has opened sufficiently to permit free, undelayed flow of ceramic balls. In order to assure the desired over-travel of the gate mechanism, additional testing has been scheduled to determine the cause and correction of binding.

Design testing has been continued on the irradiated fuel handling equipment which includes the nozzle tip-off, chain net, mattress pad and conveyor. Four tip-off designs were tested in an attempt to deliver fuel elements to the chain net in a near-vertical approach. Equipment performance was studied with the aid of motion pictures taken of fuel element trajectories. Test results indicated the need for some equipment modifications which were initiated.

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FIELD ENGINEERING OPERATION

Construction

105-N and 109-N Buildings

Work on the construction of the thermo-barriers in the inlet and outlet pipe spaces is progressing.

The architectural work by Halverson is now nearing completion, particularly in Areas 1 and 4 of 105-N. The partitions, ceilings, and floor tile have been installed in Area 1 and several of these rooms have now been occupied by Kaiser Engineers and General Electric personnel for use as temporary construction offices. General painting is continuing throughout the building.

The roof exhausters in Areas 1 and 4 of the 105-N Building have been installed by M&N Sheetmetal, however, they have all been rejected due to non-conformance to specifications. These exhausters were obtained on a Kaiser Engineers' purchase order.

Both the Zone IV and Zone V ventilation units have now been operated by Kaiser Engineers.

The installation of the fire protection sprinkler system in Area 1 and 4 in the 105-N Building is now well along. This has been inspected by the Washington State Fire Rating Bureau and work is under way making the corrections that were recommended. The hydrostatic test for this system has not as yet been accomplished.

The helium leak testing of the reactor gas system piping is now nearly completed.

The graphite cooling system risers and headers have been delivered to the job site, however, they cannot be installed because the pipe welds do not conform to the specification requirements.

There has been an improvement in the quality of the work being done by Kaiser Engineers' instrument tubing brazers, however, progress on the silver brazing of copper tubing continues to be slow.

The cracked tubing in the flow monitor system as mentioned in last month's report has been investigated and it has been determined that these failures were due to stress corrosion. All of the tubing which had been installed for this system, therefore, has been removed and procurement efforts are now under way to replace the tubing. Since the pipe space wall penetrations which contained this tubing are undoubtedly contaminated with the same residual material which caused the cracks in the tubing, these penetrations are being extensively cleaned in preparation for installation of new tubing.

The grouting and installation of the tubing penetrations through the rod room walls for the rupture monitor system has been completed. Also the heat exchanger cabinets for this system have been placed in their final locations on both right and left sides and the heat exchanger sections are now being installed.

The installation of all the motor control centers in the 105-N Building was completed on March 26, 1962. The installation of electrical cable tray above 0'-0" elevation included in the SC-87 subcontract has also been completed.

The tempo of the mechanical work in the 109-N Building has picked up somewhat during the past month. This is in part due to Kaiser Engineers starting some of their work in this building. The subcontractor on the 109-N Building has continued to apply sealant to the confinement zone penetrations and has continued the application of elastomeric coatings. General painting and structural work is progressing.

117-N Building

The vendor fabrication problems on the filter frame inserts have been resolved and 12 of these inserts have been delivered to the job site and set in place. Final alignment of these frame inserts has not as yet been accomplished, however, work on the building has resumed.

The installation of maintenance exhaust ducts in the filter cells has been started by Foster Sheetmetal. The work to date has not shown satisfactory workmanship and considerable inspection effort is being applied in an effort to improve the situation.

181-N Building

Primary pump unit No. 4 which has been under test for some time has now been rejected by Burns and Roe because neither the motor nor the pump meet specification requirements.

182-N Building

Erection of concrete block walls is now approximately 90 per cent complete. Most of the pumping equipment and the drives have been set in place and the major pipe runs are in place.

163-N and 183-N Buildings

The situation regarding the unsatisfactory installation of piping supports has not changed.

Outfall Structure

The major part of the underwater portion of the river effluent line has now been installed and is being back filled and rip-rapped. It now appears very likely that the underwater work will be completed before the high water period in the river.

File Erection

With the completion of the moderator installation, the top thermal shield and the aluminum reflector were completed. The top primary shield structure including the "I" beams and seal plates have been set in place and welded. Work is in progress in leading the stainless steel cooling tubes.

[REDACTED]

Corrective work on the ball 3-X hopper and plug assemblies is proceeding at the J. A. Jones shops in North Richland.

Preparation for installation of the process tube assembly continued throughout the reporting period and the first tube was installed April 2, 1962.

Zirconium Process Tubes

The C-25 Tube Shop facility was occupied by Kaiser Engineers on March 5 to process the final 21 tubes received from Harvey Aluminum. As of this date, all tubes have been autoclaved, 12 have been accepted as complete, 7 are being vidigaged prior to final acceptance, 1 has been rejected and will be returned to Harvey, and 1 was scratched during the process and will require rework.

Administration

The following material has been issued during the period of February 19, 1962, through March 25, 1962:

Drawings	248
Criteria	5
Specifications	13
Requisitions	62
ATP's	7
Other	16
TOTAL	351

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

Drawings	9
Specifications	1
Scope	0
ATP's	0
TOTAL	10

Bailey Meter material processed as of March 25, 1962, is as follows:

Released as Noted for Fabrication Drawings	63
Released for Comments Drawings	82
Released for Fabrication Drawings	32
Not Released for Fabrication Drawings (B&R)	6
Not Approved Drawings (GE)	6
Approved Without Exceptions (GE)	7
TOTAL	196

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PRIMARY LOOP

Ninety-six pipe spools, weighing 60 tons, have now been shipped to the field. Shipments to HUICO from their suppliers now total 652 tons, of which 316.9 tons represent high-pressure piping. Limited work has been started on fabrication of 2-5/8 inch connector tubing.

The following is the status of primary piping approval data as of the end of March, 1962:

Total number received	2102
(Includes 1409 received for information only)	
Number approved	631
Number approved with exceptions	15
Number not approved	28
Number currently being reviewed:	19
By G.E. and Burns and Roe jointly	5
By Burns and Roe (109-N)	14
Number received for information only	1409
(No approval required)	

CONSULTING ENGINEERS

The preliminary design for a 300 eMW power reactor using graphite moderation and producing superheated steam was presented at the Semi-Annual Superheat Meeting, March 7, 1962, held under the sponsorship of the Division of Reactor Development, Atomic Energy Commission.

PROGRAM EVALUATION

Design Status

	<u>Wt'd Total</u>	<u>Certified Schedule</u>	<u>Actual % Complete</u>
<u>Reactor Plant as of 4/1/62</u>			
<u>Title I</u>			
Scope		100	100 (1)
<u>Title II</u>			
Drawings	70	97	94.4 (2)
Specifications	8	100	99.3
Requisitions	8	100	87.9
ATP's	4	88	43.0
Development and Testing	<u>10</u>	<u>94</u>	<u>94.6</u>
Total	100	95	92.2

Heat Dissipation Plant as of 4/1/62

<u>Title I</u>		
Scope	100	98.8
<u>Title II</u>		
Detail Design	100	94.5

	<u>Req'd</u>	<u>No. Issued to 3/17/62</u>	
		<u>Scheduled</u>	<u>Actual</u>
Preliminary Drawings (bid)	1130	1108	1108
Detail Drawings (for const.)	1130	1108	1108
Specifications (bid)	153	152	150
Requisitions	183	169	169
ATP's	13	5	0

<u>Composite Design Completion as of 4/1/62</u>		<u>Certified</u>	<u>Actual</u>
<u>(Reactor and Heat Dissipation Combined)</u>		<u>Schedule</u>	<u>% Complete</u>
Total		97.7	94.1

(1) This percentage represents only the completion of 44 criteria and does not include updating or revising.

(2) The number of required drawings is changed from 2520 to 2525.

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Cost Estimate

No formal Washington approval has been received on the February 9, 1962 recommendation that the authorization be increased from \$145 million to \$182.6 million.

The next cost estimate review meeting by Kaiser Engineers, Burns and Roe, General Electric, and the AEC is scheduled for the week of April 16, 1962.

Schedules

No formal Washington approval has been received on the February 9, 1962 recommendation that the completion date be extended from October 1, 1962 to October 1, 1963.

The construction status as of 4/1/62, based on the Preliminary Revision # 3 to the AEC Construction Schedule, dated October 26, 1961 is as follows:

	<u>Scheduled</u>	<u>Actual</u>
Temporary Construction	74	74
General Area Systems	66	64
105-N Building	72	39
109-N Heat Exchanger Building	67	42
163N-183N Water Treatment Facilities	98	97
181-N River Water Pump House	99.8	98
182-N High Lift Pump House	97	78
184-N Standby Power House	94	82
153-N Switchgear Building	98	98.5
NPR Project (CAI-816)	72	47.7

Manager, NPR Project

JS McMahon:mf

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SIGNIFICANT REPORTS ISSUED

<u>Number</u>	<u>Class'n.</u>	<u>Author</u>	<u>Date</u>	<u>Title</u>
HW-72783	Conf.	DF Watson	2/26/62	Budget Study - Coolant Backup
HW-72935	Unclass.	ER Rudock SA Wood	2/12/62	PT IP-488-M Prototype Test of Rear Face Nozzle Hardware 105-C Leak Repairs
HW-72636	Unclass.	DF Watson	2/9/62	Project Representatives Meeting No. 1, Project CGI-905, Interim Modifications for Improved Coolant Backup - 100-B,C,D,DR, F and H Reactors
HW-73025	Secret	HW Heacock JW McCurry	3/15/62	Irradiation Processing Depart- ment Plant Improvement Program Production Data
HW-73083	Unclass.	RM Baltrusch	3/21/62	Design Test 1135 - K Self Support Outlet Nozzle Strength Test
HW-72277 Sup. 1	Unclass.	RL Woodward	3/9/62	Fuel Lubrication Test
HW-72714 Sup.	Unclass.	FS Harris	3/16/62	Final Report - Nozzle Cap Gasket Test
HW-71711	Conf.	CA Munro	3/1/62	Final Report - PT IP-360-AK Overboring Demonstration Cast Iron and Graphite Bore Enlarge- ment 105-C
HW-72519	Unclass.	W Dalos	3/19/62	DT IP-487-K Anodized Process Tubes 105-H Test Results
--	Unclass.	W Dalos	2/23/62	Dage Closed Circuit Television Systems
--	Unclass.	CA Munro	2/28/62	Reactor Rear Face Decontamina- tion
--	Unclass.	AJ Lindsay	2/26/62	Final Report - DT-1060 Evalua- tion of Strip Chart Recorder

Number	Class'n.	Author	Date	
HW-71598 Sup. A	Unclass.	HF Jensen	3/2/62	PT IP-456-AE, Sup. A, Chemical Decontamination of Reactor Rear Hardware at 105-C
HW-69432 Sup. A	Unclass.	KG Hawkins	3/2/62	Performance Test Results, Remotely Operated Tube Closure
HW-70655 Rev. 1	Secret	JL Deichman	3/30/62	Engineering Concept and Study Report High Speed Scanning Temperature Monitoring System for 105-KW Reactor
HW-72729	Unclass.	VG Blanchette	2/20/62	Proposal for 4160 Volt Bus Relaying and Operation - 165 KE-KW Buildings
HW-SA-2481	Unclass.	HA Kramer JL Rand	3/1/62	A Telemetering Installation to Report Columbia River Data by Radio
--	Unclass.	JC Baudendistel	2/13/62	Design Change No. 542 Boiler Control Modification - 184-B and D
HW-73022	Unclass.	PH Hutton	3/15/62	Interim Report - Fatigue Characteristics of Inconel "600" Tubing
HW-72044	Unclass.	PH Hutton	3/1/62	Design Change No. 527, Alt.1, Installation of 4/8" Inconel Connectors, 105-C Front Face
HW-72131	Unclass.	HC Copeland	2/27/62	Replacement and Improvement of Fixed Radiation Monitoring Instrumentation in 105-C, D, DR, H, F, KE, KW, and B
HW-72864	Secret	JA Dear	3/1/62	Bumper Fuel Charging and Metal Handling System
HW-73020	Secret	JW Ballowe	3/19/62	Irradiation Processing Department Plant Acquisition and Construction Budget Submission for FY 1964 and Revision for FY 1963
HW-72716	Unclass.	GT Haugland	2/21/62	NPR Connector Venturi Forging Defects

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<u>Number</u>	<u>Class'n.</u>	<u>Author</u>	<u>Date</u>	<u>Title</u>
HW-72846	Unclass.	GT Haugland	2/20/62	Summary of NPR Connector Venturi Pinning Tests
HW-SA-2451	Unclass.	HS Davis	2/19/62	Shielding Studies for a Power Reactor
--	Unclass.	HD Lenkersdorfer	3/2/62	Charging Machine Report No. 14
HW-72948	Conf.	D Martinos	3/9/62	Design Conclusions - 105-N Moderator Packing - Project CAI-816
HW-72891	Secret	DL Condotta	3/26/62	Reactor Design Analysis Monthly Report, February 1962
HW-73012	Conf.	RK Robinson	3/14/62	Summary, NPR Thermodynamic Parameters, Phase II and III
HW-73019	Conf.	GF Bailey	3/15/62	NPR Fuel Cycle Parameters, Phase III
HW-73101 RD	Conf.	J Muraoka	3/21/62	Consequences of an NPR Inlet Riser Rupture
--	Unclass.	JD McCullough	3/12/62	Trip Report - NPR Flow Monitor and Rod Position Instruments
--	Unclass.	JD McCullough	3/22/62	Trip Report - NPR Instrumentation
HW-65660 RD	Unclass.	WJ Mundt	3/13/62	Heat Dissipation System Project Representatives Minutes No. 63
HW-73124	Unclass.	WD Bainard	3/25/62	Water Quality Monitoring Instrumentation Minutes of Mtg. 2/26/62
HW-72769 Rev. 1	Unclass.	WW McIntosh	3/22/62	Special Requirements for Longitudinal Weld Qualification for Fusion-Welded Pipe - Record of Side Bend Test Evaluation

TRIPS

Name	Firm & Location	Date	Purpose
FJ Kempf RW Benoliel	Beryllium Corp of America Reading, Pa.	2/25-3/3/62	Discuss fabrication problems and alternate vertical safety rod channel sleeve configurations using pyrolytic graphite
	Raytheon Co. Waltham, Mass.		" "
	High Temperature Materials Co. Brighton, Mass.		" "
	American Metal Products Corp. Ann Arbor, Mich.		" "
	General Electric Co. Met. Products Dept. Detroit, Michigan		" "
CA Simsen	Instrument Labora- tory, Inc. Seattle, Wash.	3/12-13/62	To witness acceptance testing of Geminol instrumentation
JM Fox, Jr.	Gray Tool Co. Houston, Texas	3/6-11/62	Discuss NPR metallurgy on order HA-61-188-680
	BIF Industries Providence, R. I.	3/28/62	NPR venturis
	M&P Laboratory General Electric Co. Schenectady, N. Y.	3/30-31/62	NPR header metallurgy
CD Shadinger	Ladish Company Cudah, Wisconsin	Throughout Month	To provide technical liaison to NPR piping vendor
WJ Dowis	Hartford, Conn.	3/6-11/62	Attend AEC Semi-Annual Super- heat Meeting
MH Russ	Western Piping Benecia, Calif.	3/13-15/62	To discuss inspection problems, fabrication of graphite cooling piping and thermo shield barrier crates.
	Yuba Consolidated Ind. Benecia, Calif.		
CE Bonham	Gray Tool Co. & Texas Bolt, Houston, Texas	3/8-9/62	To review problems of fabrication of the nuts and studs for the NPR connector coupling

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<u>Name</u>	<u>Firm & Location</u>	<u>Date</u>	<u>Purpose</u>
WJ Morris	AMF Atomics Greenwich, Conn.	3/11-15/62	Engineering review of vendored items in progress
	Mason-Neilan Norwood, Mass.		" "
	Chandler-Evans Hartford, Conn.		" "
JF Nesbitt	AMF Atomics Greenwich, Conn.	3/5-7/62	To review testing and status of irradiated metal handling equipment
GA Newell WM Harty	Rucker Company Oakland, Calif.	2/19-3/3/62	NPR horizontal rod drive procurement
LG Henke	DeVar-Kinetics Div. of Consolidated Electro- dynamics Corp. Bridgeport, Conn. & Englewood, New Jersey	3/19-24/62	Discuss availability and design of special 105-N pressure relief valves
	Target Rock Corp. Hempstead, New York		" "
FJ Mollerus, Jr. GL Swezea	Bailey Meter Co. Cleveland, Ohio	3/19-31/62	Discuss and review analog simulation of NPR heat dissipation plant
CW Ward	Metallurgical Engineers, Inc. Portland, Oregon	3/24/62	Discuss process tube venturis
HR Kosmata	Burns and Roe, Inc. Hempstead, N. Y.	3/6/62	NPR design conference
	Atomic Energy Commission Hartford, Conn.	3/7/62	Attend AEC Superheat conference
	AEC Headquarters Washington, D.C.	3/26-27/62	Attend AEC evaluation and planning meeting
GL Swezea	Fermi Plant Monroe, Mich.	3/21/62	Discuss NPR simulator
GL Swezea WJ Mundt	Burns and Roe, Inc. Hempstead, N. Y.	3/22-23/62	Attend Task Force meeting
DL Condotta	AEC Headquarters Washington, D. C.	3/29/62	Attend ACRS meeting

Name	Firm & Location	Date	Purpose
JD McCullough	Avien, Inc. Woodside, New York	2/28-3/2/62	Discuss process tube flow monitor
	Vogue Instrument Co. Brooklyn, New York	3/2/62	Discuss rod position transducers
	Barton Instrument Co. Monterey Park, Calif.	3/14/62	Discuss process tube flow monitor
	ISI Los Angeles, Calif.	3/15-16/62	Discuss integrated data loggers
	Avien, Inc. Woodside, New York	3/26-30/62	Discuss process tube flow monitor
WD Bainard EM Kratz	Commonwealth Edison Chicago, Illinois	3/5/62	Discuss experience with chemical cleaning of nuclear piping systems
	Consolidated Edison New York, N. Y.	3/6/62	" "
	Stone & Webster Boston, Mass.	3/7/62	" "
	APED San Jose, Calif.	3/9/62	" "
EM Kratz	Rockwell Co. Fairfield, Conn.	3/8/62	Discuss NPR butterfly valves
	Byron Jackson Los Angeles, Calif.	3/12/62 & 3/18-19/62 & 3/27/62	Witness primary coolant pump tests
	General Electric Palo Alto, Calif.	3/16/62	Joint Committee testimony
GA Newell WM Harty	Rucker Company Oakland, Calif.	3/21-24/62	NPR horizontal rod drive procurement - engineering problems
R Nilson	University of Wash. Seattle, Wash.	3/5-6/62	Technical personnel recruiting
RE Hall	Bailey Meter Co.	3/17-26/62	Discuss NPR instrument design problems
	Fermi Reactor Site Monroe, Michigan		Discuss training simulator design

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<u>Name</u>	<u>Firm & Location</u>	<u>Date</u>	<u>Purpose</u>
OH Greager	Oakland, Calif.	3/20-23/62	Attend GE Technological Hazards
R Nilson		3/20-22/62	Council Meeting
RE Trumble		3/19-24/62	" "
JH Brown	AEC Washington, D.C.	3/28-31/62	Attend meeting of Advisory Committee on Reactor Safeguards
MP Johnson	Chicago, Illinois	3/27-29/62	Attend American Power Conference

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VISITORS

<u>Name</u>	<u>Firm & Location</u>	<u>Date</u>	<u>Purpose</u>
ML Mancini	Bergen Pipe Support Woodridge, New Jersey	2/20/62 & 3/9/62	Questions on pipe supports
R Manion	Hagan Chemicals and Controls Portland, Oregon	3/19/62	Discuss water quality monitor- ing information
EM Kinderman B Kleerup LM Towle	Stanford Research Institute Palo Alto, Calif.	3/9/62	AEC accountability study
JJ Schneider DH Tuel	Wyandotte Chemical Corp. Los Angeles, Calif. Wyandotte Chemical Corp. Seattle, Wash.	3/10/62 3/12/62 3/14/62	To observe and discuss reactor decontamination " "
R Day	Byron-Jackson Pumps	3/28- 4/6/62	To supervise pump installation at 100-K Area
PD Rienzo	Burns & Roe New York, N. Y.	3/16/62	NPR metallurgy
D Ebling	Engineering Services General Electric Co. Schenectady, N. Y.	3/6/62	Appraise NPR piping situation