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**MONTHLY REPORT
HANFORD ATOMIC PRODUCTS OPERATION
FOR
AUGUST 1956**

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Compiled by
DEPARTMENT MANAGERS

September 28, 1956

RICHLAND, WASHINGTON

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

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MONTHLY REPORT

HANFORD ATOMIC PRODUCTS OPERATION

AUGUST 1956

GENERAL SUMMARY

PRODUCTION OPERATIONS

The net production of acceptable slugs was 489 tons or 104 percent of the forecast. The composite yield of 79 percent was slightly higher than that of the previous month due to fewer rejects in the poor bond category.

The reactor input production was 13.7 percent higher than forecast because the actual time operated efficiency exceeded that assumed in the forecast by eight percent. The time operated efficiency of 79.8 percent is the highest ever achieved during the operation of eight reactors. This resulted from a low rupture frequency and low outage time.

The maximum established operating levels, including burnout, were increased 82 megawatts due to the relaxation of tube power limits to 1025 KW/tube at KE Reactor during July.

Eight slug failures occurred during the month with 121 hours of outage time charged to removal.

The production of high concentration product from the primary separations plants was 124 percent of the forecast. Redox operated at rates varying from five to ten tons per day. Two significant outages occurred during the month (1) for an equipment flush and (2) to convert the processing from high to low concentration material. Purex processed at a rate of 12 tons per day. One shutdown occurred due to a plugging and associated maintenance work in the plutonium concentrator.

Production at the UO_3 plant was 76% of the forecast. Equipment failures in the pots and powder unloading systems lowered production.

Fabricated and unfabricated material produced during the month met the forecast quotas. The forecast of low nitrate was not achieved due to a change in the Redox schedule which delayed the conversion of the total plant capacity to low g/t feed.

ENGINEERING TECHNOLOGY

Allegheny-Ludlum Steel Corporation signed a contract to develop quantity production techniques for the fabrication of ribbed zirconium process tubes.

The average welding yield for I and E slugs rose from 40 percent to 80 percent. This resulted from improved braze layer quality and several refinements in the welding techniques.

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Studies involving the use of low and high acid flowsheets in the Purex Process demonstrated the possibility of obtaining complete decontamination of products in two cycles of solvent extraction.

New techniques were developed for identifying eight radioisotopes in the reactor effluent water without separation.

Reactor design and development activities included studies of (1) helium cooled graphite moderated reactors for production of plutonium and electric power (2) modifications necessary to sustain higher process water flow rates in 100-K Area (3) improvements to vertical safety rods and (4) temperature monitoring and flow monitoring system components. Several design criteria were approved for the new plutonium producing reactor embodying a recirculation system (Project CG-654).

The plutonium fuel cycle demonstration reactor concepts were reviewed with a delegation from AEC, Washington, D. C. Comments favored the reactor moderated with D₂O.

GENERAL

The responsibilities for procurement of construction materials, warehousing, material control and other related functions were transferred to J. A. Jones Company on August 13, 1956.

The signing of patent agreements by the remaining 35 percent of the employees who are required to sign these forms is still being delayed. Discussions are continuing with both Legal and the Hanford Atomic Metal Trades Council in an effort to resolve the matter.

There was one disabling injury during the month which resulted from an automobile accident. Treatment was continued for one employee who accidentally inhaled plutonium on June 18, 1956.

A two week training course on the new IBM 650 Magnetic Drum Data Processing Machine was given to ten analysts.

Steps were taken by the AEC toward the ultimate liquidation of thorium inventories. Previous information indicated that there would be a protracted period of storage. Action by the AEC now appears to insure liquidation within six months.

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STAFF

Vice President and General Manager, Atomic Products Division . . F. K. McCune
General Manager, Hanford Atomic Products Operation W. E. Johnson
Counsel E. T. Maher
Manager, Finance D. M. Johnson
Manager, Employee and Public Relations L. L. German
Director, Radiological Sciences H. M. Parker
Manager, Engineering A. B. Greninger
Manager, Manufacturing W. K. MacCready
Operations Research and Synthesis C. A. Bennett

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PERSONNEL DISTRIBUTION

Department		700-1100										Other Areas*	Total
		100 -B Area	100-D Area	100-F Area	100-H Area	100-K Area	200-E Area	200-W Area	300 Area	Area & Plant General			
Engineering	- exempt	6	57	-	2	24	45	63	270	313	41	82	
	- other	26	23	3	16	22	19	36	232	186	41	60	
	Total	32	80	3	18	46	64	99	502	499	82	142	
Manufacturing	- exempt	81	61	91	91	66	90	226	114	117	-	93	
	- other	297	332	268	398	303	315	1 158	558	668	-	429	
	Total	378	393	359	489	369	405	1 384	672	785	-	523	
Financial	- exempt	-	-	-	2	-	-	5	6	124	1	13	
	- other	-	-	-	8	-	-	21	10	334	-	37	
	Total	-	-	-	10	-	-	26	16	458	1	51	
Employee and Public Relations	- exempt	26	6	6	7	5	8	14	12	212	-	29	
	- other	69	57	49	57	60	52	117	145	832	53	149	
	Total	95	63	55	64	65	60	131	157	1 044	53	178	
Radiological Sciences	- exempt	1	1	32	-	-	2	20	79	5	-	14	
	- other	-	10	45	-	5	19	26	173	21	-	29	
	Total	1	11	77	-	5	21	46	252	26	-	43	
General Manager's Group	- exempt	-	-	-	-	-	-	-	-	6	-	6	
	- other	-	-	-	-	-	-	-	-	3	-	3	
	Total	-	-	-	-	-	-	-	-	9	-	9	
Total Exempt		114	125	129	102	95	145	328	481	777	42	233	
	Total Other	392	422	365	479	390	405	1 358	1 118	2 044	94	706	
	GRAND TOTAL	506	547	494	581	485	550	1 686	1 599	2 821	136	940	

* Incl s White Bluffs and B-Y Exchange

HANFORD ATOMIC PRODUCTS OPERATION
NUMBER OF EMPLOYEES
AUGUST, 1956

<u>DEPARTMENT</u>	<u>EXEMPT</u>		<u>OTHER</u>		<u>TOTAL</u>	
	<u>8-31-56</u>	<u>7-31-56</u>	<u>8-31-56</u>	<u>7-31-56</u>	<u>8-31-56</u>	<u>7-31-56</u>
<u>GENERAL MANAGER'S GROUP</u>	6	8	3	3	9	11
<u>EMPLOYEE AND PUBLIC RELATIONS</u>						
General	9	9	7	7	16	16
Salary and Wage Administration	11	11	11	11	22	22
Personnel Practices	20	20	39	41	59	61
Education and Training	6	6	157	173	163	179
Employee Comm. and Public Rel.	13	13	41	41	54	54
Union Relations	5	5	1	1	6	6
Auxiliary Oper. and Plant Prot.	117	116	786	792	903	908
Community	67	65	278	257	345	322
Health and Safety	48	48	171	171	219	219
<u>ENGINEERING</u>						
Engineering Administration	30	31	89	90	119	121
Advance Engineering	6	6	1	1	7	7
Design	185	188	113	113	298	301
Project	188	188	132	139	320	327
Pile Technology	251	251	169	169	420	420
Separations Technology	161	163	100	103	261	266
<u>MANUFACTURING</u>						
General	23	25	9	8	32	33
Reactor	395	391	1 588	1 586	1 983	1 977
Separations	288	295	1 394	1 414	1 682	1 709
Metal Preparation	112	113	562	568	674	681
Transportation	43	44	443	446	486	490
Purchasing and Stores	60	61	226	226	286	287
Electrical Utility	16	16	75	75	91	91
<u>FINANCIAL</u>						
General	10	10	13	14	23	24
Budgets and Measurements	8	8	5	5	13	13
Contract Cost	24	24	103	104	127	128
General Accounting	8	9	61	62	69	71
Property Accounting	20	20	52	51	72	71
Auditing	15	15	2	2	17	17
SS Accountability	10	9	36	36	46	45
Personnel Accounting	9	9	55	56	64	65
Procedures and Computing	34	33	46	45	80	78
<u>RADIOLOGICAL SCIENCES</u>						
General	6	6	-	-	6	6
Records and Standards	33	33	187	184	220	217
Biophysics	56	58	64	64	120	122
Biology	30	29	43	43	73	72
Engineering	12	12	1	1	13	13
Administrations and Communications	3	3	4	4	7	7
GRAND TOTAL	<u>2 338</u>	<u>2 351</u>	<u>7 067</u>	<u>7 106</u>	<u>9 405</u>	<u>9 457</u>

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MANUFACTURING DEPARTMENT

AUGUST, 1956

METAL PREPARATION SECTION

The net production of acceptable slugs was 489 tons which was 104 percent of the forecast.

The composite yield of 79 percent was slightly higher than that of the previous month, because of fewer rejects in the poor bond category.

A 1.4 month inventory of acceptable slugs was on hand at month end. The inventory of bare slugs continued low, with the supply ranging up to a 12-day level, but falling back to only four days at month end.

There were no slug failures in autoclave testing during the month.

REACTOR SECTION

The reactor input production was 13.7 percent higher than forecast because the actual time operated efficiency exceeded that assumed in the forecast by 8 percent. The time operated efficiency of 79.8 percent is the highest ever achieved during the operation of eight reactors and resulted from a continued low rupture frequency and low outage time required for tube leak testing.

Output production was 84.3 percent of forecast due largely to a delay in converting to a reduced goal exposure for high concentration material.

The maximum established operating levels, including burnout, were increased 82 megawatts due to the relaxation of tube power limits to 1025 KW/tube at KE during July.

A total of eight slug failures occurred during the month with 121 hours of outage time charged to removal.

Twenty-four reactor scrams occurred during the month, ten of which were caused by normal Panellit system variables.

There were no outages necessitated by process tube leaks during August. Sixty-seven tubes were leak tested at F Reactor during a tube replacement outage and two Van Stone leaks were corrected. Another tube leak was caused at KE by a rupture. At month end water collection was normal at all reactors.

Tube replacement programs were conducted at B, D, F and H Reactors with 465 tubes removed and replaced, four tubes removed and not replaced, and five air channels retubed. A total of 492 hours were required for the tube replacement work.

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SEPARATIONS SECTION

The production of high concentration product from the primary plants was 124 percent of the forecast. The forecast was exceeded because of the continuance of Redox on high concentration feed until Purex had achieved reasonable operational equilibrium on high concentration feed. The delay in converting the Redox capacity to low feed resulted in that forecast quota not being met.

The Redox plant operated at rates varying from five to ten tons per day. Two significant outages occurred during the month, the first from August 4 to 9 for an equipment flush and the second from August 23 until month end to convert the processing from high to low concentration material. In addition to virgin feed a quantity of UNH contaminated with plutonium was also reworked during the month.

The Purex plant, except for one outage period, processed at a 12 ton per day rate. The facility was shut down from August 1 to August 8 due to a plugging and associated maintenance work in the plutonium concentrator. During the period of August 19 to August 22 the first uranium decontamination column was upset through processing difficulties which resulted in a quantity of high gamma product being sent to TBP for further decontamination. The plutonium product was essentially within specification throughout the month.

Production at the TBP plant exceeded the forecast by 13 percent.

The output of the UO_2 plant was 76 percent of the forecast with production being adversely affected throughout the month by equipment failures in the pots and powder unloading systems.

The total quantity of fabricated and unfabricated metal produced during July and August met the forecast quotas. The forecast of low nitrate was not achieved due to a change in the Redox schedule which delayed the plant capacity conversion to low g/t feed.

GENERALPersonnel

Total on Roll	August 1, 1956	5268
Net Decrease		34
Total on Roll	August 31, 1956	5234

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W. K. MacRae
MANAGER

MANUFACTURING DEPARTMENT

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MANUFACTURING DEPARTMENTPATENT SUMMARY
FOR
MONTH OF AUGUST, 1956

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

INVENTOR

S.H. Woodcock
F.B. Quinlan

TITLE

A method of producing a sheathed thermocouple and lead with the couple cold-formed as an integral part of the sheath

W.J. MacReady

MANAGER
MANUFACTURING DEPARTMENT

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HW-45815

METAL PREPARATION SECTION

August, 1956

I. RESPONSIBILITY

There was no change in responsibility of the Section during August.

II. ACHIEVEMENT

A. Operating Experience

1. Statistics

	<u>August</u>	<u>July</u>	<u>Year to date</u>
Total Acceptable Slugs Canned (Tons)	489	434	3,314
Composite Canning Yield (%)	80	77	77
Efficiency (%) (Canning Throughput)	92	91	89
Forecast Achievement (Current Commitment)	104	100	101
Net Acceptable Solid Slugs (Tons)	480	414	3,166
Slugs Returned from Reactor (Tons)	1.69	2.13	16.80
Canning Yield (%)	80	77	77
Autoclave Failure - Solid (No./M)	9	20	148
Slugs Returned from Reactor (Tons)	3.74	1.85	7.27
Canning Yield (%)	82	79	70
Autoclave Failure - Solid (No./M)	0	0.007	.001
Autoclave Failure - Cored (No./M)	0	0	0
Acceptable C-4 Slugs Canned (Pieces)	0	0	414
Acceptable Pb-Cd Slugs Canned (Pieces)	5,947	3,491	36,150
Average Steam Generated (M lbs/hr.)	21.0	24.8	
Maximum Steam Generated (M lbs/hr.)	32.5	33.0	
Total Steam Generated (M lbs.)	15,659	18,470	
Coal Consumed (Tons)	1,101	1,220	
Sanitary Water from 3000 Area (M Gals.)	64.4	64.8	
Average Rate (GPM)	1,442	1,452	

2. Activities

Increased canning yields and operating efficiencies made possible the attainment of a new production record of 489 tons of acceptable canned slugs during the month of August. This production, which was 104% of forecast, was achieved by operating seven canning lines for the first nineteen working days and six canning lines the remaining four working days of the month. The reduction to six canning lines was made in an attempt to more evenly balance the bare and canned slug inventories. Inventories of bare slugs had been reduced considerably due to the failure of an equalizing furnace at N.L.O. No metal shipments were received for a period of approximately two weeks.

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METAL PREPARATION SECTION2. Activities (Continued)

The inventory of acceptable canned slugs in 100 - 300 storage areas increased to a 1.4 months' supply by month-end. The bare slug inventory, which had been built up to a high of 12-days supply on August 10, was reduced to a four-day supply at month-end. This decrease resulted from the interruption of shipments from the slug fabrication plant for a period of 12 days while some critical equipment was being repaired. This condition was corrected and shipments were resumed by the end of the month. Almost all of the normal monthly shipments for August had been received prior to this breakdown; thus continuity of 300 Area operation was not interrupted.

The over-all canning yield increased to 80% which is approximately 3% over July and 4% above the forecast. This increase resulted from improvements in several reject categories, the major ones being marred surfaces, bond test rejects and voids.

The obsolete frost test equipment was transferred to the 314 Building for storage and experimental use.

The steam pole replacement program is 70% complete. It is planned for completion in September.

There were no autoclave failures during the month.

3. Special Operations

Since all dingot slugs presently being received are heat-treated off-site, it was not necessary to operate the salt bath heat-treating facilities in 313 during the month. Future operation of this equipment will be limited to processing rejects from the transformation tester and for special tests.

A total of 6,407 lead-cadmium slugs were canned and inspected during the month, producing 5,947 acceptable pieces for a yield of 92.8%.

4. Schedule Variance

The all-time high production output for August was 104% of that forecasted in the Official Production Forecast (HW-43955). Canning yields were up 4% and operating efficiencies 2% over those values used in the forecast.

A new Official Production Forecast was issued on August 20, reducing 300 Area production about 350 tons for the remainder of FY 1957. Because of this decrease, three additional operations were postponed from December, 1956 to March, 1957.

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METAL PREPARATION SECTION

B. Equipment Experience

1. Operating Continuity

The "time operated" efficiency of 92% for the canning lines is the highest attained since the finishing line conveyors were put into use in December, 1955.

During an electrical storm on the evening of August 23, a momentary power failure caused the mercury lamps in the canning area to go out. Because of the unusual operating characteristics of this lamp, the canning operation had to be suspended for 10 minutes while awaiting the lamps to reach full brightness again.

2. Inspection, Maintenance and Replacements

In order to utilize a large room on the mezzanine of 313 building for office space, a large vacuum motor and separator units for the vacuum system servicing the canning area were removed and replaced by small portable vacuum units.

After a nine-day trial run, the can cleaning machine was shut down for further modification. The baskets for holding the parts require redesigning and all brass parts will be replaced as these seem to contribute to corrosion of the aluminum components when particles of brass loosen and fall from the machine into the various process solutions.

The services of a factory representative for the Acme-Gridley lathes was available throughout the month to provide training for better servicing of this equipment. Several training sessions were conducted with maintenance personnel.

Two additional remodeled radiograph trays were received during August. Four trays remain to be altered.

C. Improvement Experience

1. Production Tests

P.T. 313-47-MT "Cored Slugs from Extruded Blanks and Rolled Rods"
HW-33189

The remaining cored slugs, having 3/8-inch axial hole diameters, were processed during this period. A total of 9 tons of finished slugs was produced with a yield of 82 percent.

Approximately eighteen tons of bare cored slugs with 1/2-inch hole diameters have been received from Fernald. The preparation of this material for pile evaluation will begin early in September. The first two groups of 1/2-inch bare cored slugs and the large diameter aluminum plugs were received and statistically inspected during the month.

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METAL PREPARATION SECTION1. Production Tests (Continued)P.T. 313-56-MT "Canning of Four Tons of Dingot Uranium for Pile Evaluation" HW-37695

The processing of dingot uranium slugs for intermediate goal exposure was continued as authorized by Supplement A of the production test. Twenty-two tons of finished slugs were produced with a 63 percent yield. Excess hydrogen in dingot metal continues to cause an abnormal reject rate, which results from slug outgassing during the canning assembly operation.

Twelve tons of dingot slugs machined from rods outgassed in a chloride salt bath at Mallinckrodt Chemical Works were received to further evaluate the effect of rod outgassing on the hydrogen content and structure of the metal. In addition one large dingot has been produced at Mallinckrodt with low hydrogen content through special treatment of the slug used to line the reduction bomb. The slugs from this dingot will be shipped to Hanford for evaluation.

P.T. 105-615-A-65-MT "Irradiation of Slugs Having Truline End Contours" HW-40526A

It is currently planned to begin processing truline solid slugs in September to replace approximately one-half of the slugs discharged from C Pile. Ninety thousand cans were previously received for this test. Maintenance problems arising in the operation of Acme-Gridley machines for facing assembled slugs has delayed the preparation of truline material.

P.T. 71-MT "Evaluation of MIZ-2 Separation as a Criterion for Eliminating Rupture Prone Slugs" HW-42087A

Separation of bare slugs using the metal quality tester was continued. Approximately 200,000 of the 255,000 slugs scheduled to be processed have been sorted, separating the poorest five percent from the upper ninety-five percent quality level material to compare in-pile performance.

P.T. 105-629-A-73-MT "Evaluation of I and E Slugs Operating at High Specific Tube Powers" HW-43078A

Four tubes of enriched (1.44% U-235) I and E slugs and four tubes of enriched solid slugs have been finished and tested for charging in C Pile. These slugs will be irradiated at high specific tube powers to compare performance.

In addition, 1,155 normal uranium I and E slugs were canned to improve canning and welding techniques. Welding yields were improved about twenty percent by increasing argon gas flow and reducing amperage. Braze porosity continues to be a problem in the canning assembly operation.

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METAL PREPARATION SECTION

1. Production Tests (Continued)

P.T. 105-631-A-74-MT "Preliminary Evaluation of Slugs with Thin Caps and Can Bases" HW-43032A

Six hundred solid eight-inch slugs were canned in truline aluminum cans, and the caps and bases of the assembled slugs were faced to a nominal thickness of 1/8 inch and 1/10 inch respectively. It is planned to irradiate nine tubes of these slugs with nine tubes of standard production slugs to obtain preliminary data on the performance of fuel elements having thin caps and bases.

2. Process Tests and Revisions

Because of the excellent control of slug length obtained using the mechanical quench machines and automatic facing lathes, it has been possible to reduce the average length of the canned slugs within the range of the Engineering Department Specifications. The average length has been reduced from 8.850" to 8.835", which should result in some increase in neutron economy within the reactors by increasing the ratio of core weight to jacket weight.

The prototype equipment for vibrating the can-sleeve assembly in the canning furnace is operating satisfactorily and large base voids, caused by entrapped air, are being consistently eliminated. Bond test reject rates of vibrated slugs are 50 to 60 percent lower than those of non-vibrated slugs canned in the same furnace. It is expected that this rate can be further improved by adjustments in cycle timing and air flow. Most of the equipment is now on Plant for the installation of vibration on all canning lines and installation should be completed by the second week of September.

3. Inventions and Discoveries

An invention report was submitted by S. H. Woodcock and F. B. Quinlan for a method of producing a sheathed thermocouple and leads with the couple cold-formed as an integral part of the sheath.

D. Events Influencing Costs

1. Labor Variance

No appreciable change is anticipated in the unit cost of direct labor.

2. Material Variance

No appreciable change is anticipated in the unit cost of direct material.

3. I. M. E. (Other Costs)

A decrease of 0.005 in I.M.E. resulted from an increase in production for the month.

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METAL PREPARATION SECTION

E. Plant Expansion

1. Project Status

Project CA-590 - Fly Ash Collection Equipment - 384 Building

The Fly Ash Separator has arrived on plant and the contractor has completed the installation of the separator on the 384 Building with minor exceptions. Acceptance testing will be initiated the first week in September with the completion of the work expected September 15, 1956.

Project CA-601 - General Grounds Improvements - 300 Area

The bid for this project was let to the low bidder, L. W. Vail Company on July 2. Although this project was authorized in FY 1956, construction was not scheduled to start until FY 1957. For this reason the project will be financed from the FY 1957 Plant and Equipment Budget. Funds from this budget will be available during the latter part of August. Construction will start 10 days after notification of availability of funds.

Project CG-640 - Noise Reduction - 300 Area

Minor Construction completed their phase of the acoustical treatment of the 313 Building during the month. The excess acoustical material will be stored within the 3722-A Building and will be available for use by others.

The unistrut material for installing the noise stop baffles over the canning area arrived on plant-site August 20, 1956, and work will resume on this area in the near future.

The Industrial Sound Company, the apparent low bidder on the three improved lathe enclosures for the Acme-Gridley Bar machines, have submitted detailed shop drawings for our approval.

The actual measurements of that part of the noise reduction program that has been completed will be made as soon as the sound level meters are returned from the East, where they have been sent for re-calibration.

Minor Construction estimated the cost of installing two centrifugal blowers, in lieu of the fourteen IIG inductor cooling fans, will be \$13,000.00 for material and installation costs.

CG-646 - Modifications to Pickle Machines - 313 Building

The Metal Wash Company has commenced fabrication of the first unit. There have been conflicts in the completion dates for the units supplied by them. The Metal Wash Company is being contacted in an effort to establish firm completion dates.

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METAL PREPARATION SECTION

F. Significant Reports Issued

1. Routine

<u>Number</u>	<u>Title</u>	<u>Author</u>	<u>Date</u>
HW-40819 RD	Six-Months Production Forecast	HE Berg	8-8-56
HW-44345	Report of Uranium Accountability WG Tews in Metal Preparation Processes for the Quarter Ending 6-30-56		7-18-56
HW-44774	Monthly Report, Process Sub-section, Metal Preparation Section, July 1956	KV Stave	8-1-56
HW-44775	Monthly Report, New Fuel Element Production Program July 1956	WA Blanton	8-1-56
HW-44845	Production Report, Metal Preparation Section	HE Berg	8-7-56
HW-44880	Request for Procurement of "C" Slugs	HE Berg	8-8-56
HW-44926	General Analytical Control Program I	GB Hansen	8-13-56
HW-44935	Operation Subsection Monthly Report	WW Windsheimer	8-2-56
HW-45067 RD	Official Production Forecast.	HE Berg	8-17-56
HW-45103	Historical Measurements on Bare and Canned Slugs	GX Beard and KE Carpenter	8-28-56
None	Monthly Report, Projects & Personnel Development, July 1956	DW Haught	8-3-56
None	Monthly Report, Contact Engineering Unit	JW Nageley	8-20-56

2. Non-Routine

HW-45155	Evaluation of Small Diameter Caps	DD Stone	8-31-56

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METAL PREPARATION SECTIONIII. PERSONNELA. Organization

R. A. Farran, Process Improvement, terminated to accept employment elsewhere.

J. E. Bergman returned from the service and will assume duties of Specialist, Vendor Liaison.

R. R. Witek, Maintenance Application Engineer, transferred to Atomic Power Equipment, San Jose, California.

B. Force Summary

	<u>Start of Month</u>		<u>End of Month</u>		<u>Net Change</u>	
	<u>Ex.</u>	<u>Non-Ex.</u>	<u>Ex.</u>	<u>Non-Ex.</u>	<u>Ex.</u>	<u>Non-Ex.</u>
Section General	1	1	1	1	0	0
Operations	22	164	22	164	0	0
Process	40	63	40	64	0	1
Power & Maintenance	37	333	36	330	-1	-3
Projects & Personnel	14	5	14	4	0	-1
Section Total	114	(680) 566	113	(676) 563	-1	-3

C. Safety Experience

The 300 Area has operated 366 days since last disabling injury. Members of the Section suffered 40 medical treatment injuries with a frequency rate of 4.15.

There were no disabling injuries and no other accidents or incidents.

There were no security violations for the month.

D. Radiation Experience

No exposures in excess of 200 mrad per week and only one exposure in excess of 100 mrad per week was reported during the month. For the second time in two months, a new low has been established in badge readings for the Section.

E. Personnel Activities1. Visits and Visitors

S. M. Gill visited Mr. F. R. Dowling, OROO, Oak Ridge, August 28 to discuss uranium extrusion. On August 29, S. M. Gill visited Mr. W. J. Koshuba, ANP, Cincinnati, Ohio to discuss uranium fuel element development.

2. Meetings

Members of the Section attended 3 round table discussions, 14 information meetings, 6 staff meetings and 7 safety and security meetings. Training courses were attended by 27 Section members.

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Richland, Washington
September 13, 1956

MANUFACTURING DEPARTMENT
REACTOR SECTION
MONTHLY REPORT
AUGUST, 1956

I. RESPONSIBILITY

Assigned responsibilities of the Reactor Section remained unchanged during August.

II. ACHIEVEMENT

A. Operating Experience

Reactor time operated efficiency for August was 79.8 per cent, 4.7 per cent higher than July and 3.0 per cent higher than June. This efficiency was the highest ever achieved during operation of eight reactors. Major items necessitating downtime were, in order of importance, (1) tube replacement, (2) charge-discharge, (3) rupture removal, and (4) maintenance.

Reactor input production (Pu) for August was 113.7 per cent of forecast due primarily to higher than forecasted operating levels and efficiencies. This represents a new record input production, exceeding the previous record of June, 1956, by 3.6 per cent. In addition, an individual area record input production was achieved at KW Reactor, exceeding their July, 1956, record by 4.7 per cent.

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A. Operating Experience (Continued)

Reactor output production for August was 84.3 per cent of forecast due primarily to a delay in converting to a modified goal exposure for high concentration material. The discharge of high and low concentration material was 78.5 and 131.8 per cent of forecast, respectively.

The established maximum reactor operating level, excluding burnout, was increased 82 megawatts at KE Reactor. This increase resulted from the relaxation of tube power limits to 1025 kw/tube during July.

A total of eight slug failures occurred in August as compared with eight in July and eleven in June. Total reactor outage time in August caused by ruptures was 232.7 hours, of which 121.5 hours were required for rupture removal, and the remaining hours were utilized for charge-discharge and miscellaneous maintenance.

Reactors sustaining ruptures were as follows:

	<u>C</u>	<u>D</u>	<u>DR</u>	<u>KE</u>	<u>Total</u>
Eight-Inch Regular	3	1	2	2	8

1. Statistics

Operating statistics are summarized in the table on Page 3.

2. Activities

Tube replacement programs were conducted at B, D, F, and H Reactors with 466 tubes removed and replaced, five empty channels retubed, and four tubes removed but not replaced. Reactor outage time required for these programs was 492.1 hours. This figure includes the 55.3 hours during July which were used at H Reactor on the outage extending into August.

At B Reactor, 67 tubes were removed and replaced and two empty channels were retubed in 79.5 hours. At D Reactor, 100 tubes were removed and replaced in 91.9 hours. At F Reactor, 97 tubes were removed and replaced, three empty channels were retubed, and four tubes were removed but not replaced in 131.1 hours. At H Reactor, 202 tubes were removed and replaced in 189.6 hours.

<u>Reactor</u>	<u>Number Removed</u>	<u>Number Replaced</u>	<u>Exposure/Tube mrads</u>	<u>Hours/Tube</u>
B	67	69	153.5	1.07
D	100	100	119.0	0.76
F	101	100	111.9	1.03
H*	202	202	90.0	0.82

*Outage began July 30.

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1. Statistics

	<u>B</u>	<u>C</u>	<u>D</u>	<u>DR</u>	<u>F</u>	<u>H</u>	<u>KE</u>	<u>KW</u>	Total Or Ave.
Reactor Time Operated Efficiency (%)	77.8	73.9	78.2	92.7	77.1	71.4	80.6	86.7	79.8
Reactor Outage Time (Hrs)	160.7	191.3	161.9	52.6	170.5	207.1	114.7	98.6	1157.4
Plutonium Production	4.5	3.0	0	1.5	0	6.0	30.0	0	45.0
Special Irradiations and Tests	165.2	194.3	161.9	54.1	170.5	213.1	144.7	98.6	1202.4
Total Outage Time	3.2	164.1	28.8	54.1	1.5	0.7	144.7	98.6	495.7
Reactor Unscheduled Outage Time (Hrs)	54.4	120.5	28.4	39.9	14.9	32.2	84.1	75.0	449
Metal Discharged (Tons)									
Water Quality (ppm Turbidity)									
Raw Water - Average	14	19	13	15	8	8	15	15	
Raw Water - Maximum	222	180	127	161	227	256	188	207	
Process Water - Average	0.005	0.005	0.004	0.004	0.005	0.003	0.004	0.004	
Process Water - Maximum	0.006	0.007	0.006	0.006	0.010	0.005	0.006	0.006	
Water Pumped (MM Gals)									
Bldg. 190 to Reactor	1768	3085	1848	2196	1732	2053	5660	5942	24284
Bldg. 182 to 200 Areas			629		2049	2388	5915	6272	629
Bldg. 181	5516		5762						27902
Steam Generated (MM Lbs)									
Coal Consumed (Tons)	147		230		119	91	29	21	637
Oil Consumed (M Gals)	9230		15201		8241	6060			38732
							273	222	495

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DECLASSIFIED**A. Operating Experience****2. Activities (Continued)**

At H Reactor, a record high removal and replacement rate of 30.8 tubes per day was achieved during the second week of the outage. This record is particularly noteworthy in that, in the past, the most severe obstacles in the tube replacement program have been encountered at H Reactor.

At D Reactor, later in the month, the record rate set at H Reactor was broken - 31 tubes per day was achieved.

Raw water turbidity increased significantly on two occasions during August. The normal turbidity of 5 to 20 ppm increased to 130 ppm on August 17 and 18, as a result of flash floods in the Chelan area. On August 27 and 28, flash floods in this area again raised the turbidity - this time to 450 ppm. Acceptable process water quality was maintained by use of increased coagulant dosage rates and shortened filter runs.

The following table indicates activities during August associated with special irradiations other than the programs noted above.

	<u>Tubes Charged</u>	<u>Tubes Discharged</u>	<u>Casks Shipped</u>
Production Tests	4	13	1
Mint Flattening	47	27	0
"B" Metal	3	0	0
"C" Metal	7	7	0
10-66 Material	0	0	13
Totals	61	47	14

B. Equipment Experience

A total of 24 reactor scrams occurred in August, of which 14 were caused by normal Panellit system variables and 2 were caused by spurious beckman trips. Causes of the other 8 scrams were as follows:

<u>Reactor</u>	<u>Reason</u>
K	Building 1706-KER pump failure caused by a short in a light circuit during replacement of a light bulb.
C	Faulty thermocouple indicated water temperature in excess of limits.
KW	LSB switch on vertical safety rod No. 54 opened.
H	Low pressure Panellit trip due to failure of a fitting on a KAPL 120 pressure gage.

B. Equipment Experience (Continued)

<u>Reactor</u>	<u>Reason</u>
KW	Pile period meter trip due to improper switching.
KE	Panellit trip due to improper valving at Building 165-KE during attempt to furnish back-up to high-pressure cross-tie line.
B	Panellit scram due to pressure drop during removal of Building 190-B process water pump from service.
B	Panellit scram due to pressure surge during start-up of Building 190-B process water pump.

No outages were required for leak testing during August. However, 67 tubes were tested and two Van Stone leaks were found during a tube replacement outage at F Reactor. At month end, water collection rates were normal at all reactors. Of particular significance was the fact that August was the first month since October, 1955, that F Reactor was not shut down for leak testing purposes. An accelerated tube replacement program based on leak experience was initiated at F Reactor in June. This program is considered to be the primary reason for the improved performance.

Inspection of rear face thermocouple leads at the K Reactors indicated a life expectancy of only 8 to 12 months at KW Reactor and 10 to 15 months at KE Reactor.

The line size of a portion of the gamma monitor sample lines at B Reactor was increased resulting in improved flow control. The remainder of the lines will be increased in size if additional testing demonstrates continued improved flow control.

Borescopic inspection of two C Reactor vertical safety rod channels containing unknown obstructions showed separation of the graphite blocks. A number of third safety system balls were noted in one of the separations; as a result, dropping of balls for functional testing purposes was discontinued until the situation can be corrected.

Galling of the DR Reactor poison column ball valve seats and valve stems continued. Testing of modified front and rear ball valves is in progress.

Difficulty continued with the K Reactors vertical safety rod systems. KW Reactor was scrambled by a faulty LSB switch, and latching difficulties occurred on two rods at KE Reactor. Rod withdrawal problems persisted hindering scram recoveries. Inspection showed several KW Reactor gas seals to be badly deteriorated. Later tests with a rod section heated to 500 C showed that the seal will stick to a

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B. Equipment Experience (Continued)

stationary rod and then tear as the rod moves. The gas seal vendor was contacted for his suggestions on the problem. The ISA switches at KE Reactor were removed from service because they are not required by Process Standards and they have caused a number of third safety system ball drops.

Continued testing of the V-73 cross-tie quick opening valves at the K Reactors demonstrated satisfactory performance.

The results of Panellit gage checks made in August disclosed the following faults:

<u>Reactor</u>	<u>High Trips</u>	<u>Low Trips</u>	<u>Mercury Separations</u>	<u>Leaks</u>	<u>Misc.</u>	<u>Total</u>
B	4	1	0	1	0	6
C	0	0	0	0	0	0
D	0	0	0	0	2	2
DR	0	0	1	2	4	7
F	0	0	0	1	0	1
H	0	0	0	1	7	8
KE	0	6	249	0	0	255
KW	0	2	68	0	0	70
Totals	<u>4</u>	<u>9</u>	<u>318</u>	<u>5</u>	<u>13</u>	<u>349</u>

The No. 10 process pump motor at Building 190-B failed during a routine start-up on August 23, as a result of deteriorated insulation on electrical leads and motor windings. Repairs were completed and the unit returned to service on August 25.

The modified original impellers of the fluid drive components of two Building 190-C process pump units were replaced with impellers of new design and improved materials.

Faulty components of the No. 3 liquid rheostat at Building 165-KE were replaced. This work included installation of Epoxy-type tank cells, adjustable lower electrodes, and flexible shunt connectors. The unit operated satisfactorily when tested August 29.

During a normal shutdown of a Building 165-KW process pump motor, limit switches on the liquid rheostat failed, resulting in breakage of two electrode guide bars. Repairs were completed the following day and the unit was returned to service.

Anthrafilt addition to Building 183-C and KE process water filters was completed during August, thereby restoring normal filter media levels. Anthrafilt addition at Building 183-D is in progress.

C. Improvement Experience

The most significant Production and Process Tests are reported below, together with other items of improvement significance.

C. Improvement Experience (Continued)

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PT-105-550-E - "Operation of the In-Pile Facilities of the 1706-KER Semiworks"

Six tubes at KE Reactor continued in operation under this test. Two tubes were operated at a pH of 7.0, two at a pH of 6.5, and two at a pH of 6.0. Outage time charged to this test during August was 30 hours.

PT-105-554-E - "Evaluation of 7.0 pH Process Water"

Water at a pH of 7.0 continued to be supplied without difficulty on a half plant basis at F Area. The pH of process water supplied by the other half of the plant was lowered from 7.65 to 7.30 on August 1, as authorized by a revision to the test specification.

PT-105-663-E - "Evaluation of Synthetic Coagulant Aid"

Addition of Separan as a coagulant aid continued on a half plant basis at DR Area without difficulty. On August 31, Separan addition was discontinued as seasonal raw water quality improvements made coagulant aid addition unnecessary.

Nine revised Process Standards - Reactor were approved and issued. The Standards changed are titled, 1) "Pressure and Flow During Reactor Shutdown," 2) "Panellit System Control," 3) "Emergency Water Supply," 4) "Flux Monitors," 5) "VSR Withdrawal," 6) "Horizontal Rod Withdrawal," 7) "Make-Up of Tube Changes," 8) "Emergency Water Requirements," and 9) "Emergency Electrical Requirements - K Water Plants."

The most significant changes accomplished in these Standards are, respectively, 1) allowance of a partial reduction of crossheader pressures prior to valving rear crossheaders to the drain riser, 2) requirement of a manual scram if certain abnormal conditions occur during the time a Panellit gage is by-passed for charging a poison column control tube, 3) specification of new Grove valve trip settings and sensing line requirements and inclusion of K Area emergency generator requirements, 4) specification of more restrictive flux monitor trip settings for hot start-ups, 5) addition of requirements to be met before withdrawal of vertical safety rods, 6) further restriction of horizontal control rod withdrawal in the approach to critical, 7) revision of the rear dummy charge for poison tubes, 8) specification of K Area generator requirements for emergency water, and 9) provision for testing K Area generators during either reactor operation or shutdown.

The "Process Equipment Standards" manual was issued in August. This is a companion manual to the "Process Standards-Reactor" manual and will contain all "non-critical" limits. The "Process Standards - Reactor" will henceforth contain only "critical" limits.

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C. Improvement Experience (Continued)

Personnel in the Reactor Section engaged in work which might be expected to result in inventions or discoveries have reported that no inventions or discoveries were made during the period covered by this report.

D. Events Influencing Costs

Irradiation costs for August are expected to be approximately \$96,000 higher than July. The major factors contributing to this increase are 1) a longer stores accounting period, and 2) increased coal and chemical consumption resulting from the higher reactor operating efficiency.

Unit cost for August is expected to be slightly higher than July due to the expected increase in total cost while production increased only slightly. Unit cost for August is expected to be the third lowest on record, however, the record being established in April, 1956.

E. Plant Development and Expansion

1. Project Status

The most significant Reactor Section project activity is reported below. Further details concerning projects may be found in the report, "Status of Reactor Section Projects, Informal Requests, and Budget Items," F. A. R. Stainken to R. S. Bell, dated August 20, 1956.

CA-512 - 100-K Area

Work completed during the month included: 1) issuing of a work order to complete vertical safety rod modifications, 2) installation of the shield cooling PRV station at Building 105-KE (essentially completed at Building 105-KW), 3) replacement of 325 temperature monitor compensating resistors at Building 105-KE, 4) repair of the 107-KW tank foundations, 5) modification of the gas unloading facilities, 6) installation of "fire-eyes" on Nos. 2 and 3 boilers at Building 165-KE, 7) modification of the heating and ventilating systems in Buildings 1704-K and 1720-K, and 8) installation of desert coolers on a temporary basis for the Building 183-KE and KW control rooms. In addition, 1) a decision was reached to relax the Panellit gage calibration requirements, 2) work continued on enclosing the temperature monitor cubicles at Buildings 105-KW and KE, 3) work continued on the 107-KE tank foundation repairs, 4) work continued on the replacement of the activated silica system acid piping, and 5) the AEC disqualified all current bids for acid feed pH control.

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E. Plant Development and Expansion

1. Project Status (Continued)

CG-558 - Reactor Plant Modifications for Increased Production

A decision was reached to recommend selection of Hamlin "Flexor" switches to replace unsatisfactory switches installed on the project. A study began on how to maintain oil ring rotation during Building 190 turbine operation at low speed. Pre-shutdown construction remained approximately on schedule. The first major outage, at 100-B, was scheduled to begin September 24.

CG-651 - Continuous Charge-Discharge - C Pile - Demonstration Unit

Project Maintenance Unit continued prefabricating valve racks and installing conduit runs. Process made film studies of the front face to determine the degree of gamma and neutron radiation present during operation. Testing of individual tube outlet deflection devices neared completion. Preparation continued on the revision to the project proposal requesting additional time and money.

2. Plant Engineering

A number of engineering and development studies were active in the Reactor Section during August. The studies, in general, are aimed at decreasing costs and/or increasing production. Details are given in Document HW-45123. Several items of interest are reported below.

A study was initiated aimed at developing a remote operated manipulation which will be capable of performing most rear face tasks. A literature survey is in progress.

Preliminary design sketches were prepared of a machine capable of automatically loading slugs in a bucket and separating dummies from regular metal.

A 12-tube prototype individual tube rupture detection system was essentially completed. This system will be installed on the C Reactor as soon as outages permit.

Testing of the prototype operational charge-discharge slug deflector continued. High speed movies were taken of discharges through the prototype deflector to study the movements of the slugs.

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DECLASSIFIED**F. Significant Reports****1. Routine**

Monthly operating reports issued for July were:

HW-44580-A	Reactor Section	R. S. Bell	8/8/56
HW-44788	Operations Sub-Section	A. R. Maguire	8/1/56
HW-44577	Process Sub-Section	O. C. Schroeder	8/1/56
-	Projects & Personnel Development	F.A.R. Stainken	8/1/56
HW-44794	Radiation Monitoring Sub-Section	P. C. Jerman	8/1/56
-	Reactor Areas Maintenance	R. T. Jessen	8/6/56
-	Project and Special Reactor Maintenance	E. E. Weyerts	8/7/56
HW-44791	Power Sub-Section	J. C. McLaughlin	8/3/56

Other routine reports issued during August included:

HW-45042	"Monthly Progress Report - New Plants Expansion - Reactor Section"	D. S. Lewis	8/27/56
HW-45100	"Monthly Progress Report, Reactor Section Expansion, August, 1956"	J. P. Langan	8/31/56
-	"Status of Reactor Section Projects, Informal Requests, and Budget Items"	F.A.R. Stainken	8/20/56
HW-44581	"Reactivity Balance and Associated Data, July, 1956"	A. P. Vinther	8/1/56
HW-45109	"Reactivity Balance and Associated Data, August, 1956"	R. E. McGrath	8/29/56

2. Non-Routine

-	Personnel Exposure Problems Associated with Charge-Discharge During Operation	F.A.R. Stainken	8/14/56
HW-41000	Process Equipment Standards	P. Thompson	8/56
HW-44773	An Analysis of Reactor Section Rupture Experience in Regular Metal Exposed to High Concentration	J. R. Young	8/6/56
HW-44887	Reactor Scram Analysis	J. R. Young	8/13/56
HW-45101	Outage Time Utilization Data	T. D. Dow	8/29/56
HW-45102	Production Losses and Reactor Performance at the Hanford Reactors	T. D. Dow	8/29/56
HW-44986	Sub-Critical Flux Monitoring With Boron Trifluoride Neutron Proportional Counters	G. F. Owsley	8/17/56
HW-45032	Status of Physics Studies	R. E. McGrath	8/20/56
HW-45043	Outage Time Survey	A. P. Vinther	8/22/56
HW-45118	Final Report - Production Test 105-5-MR and Production Test 105-5-MR, Supplement A, Use Of Helium Gas to Reduce Reactivity Coefficients on Minimum Time Outages	Y. Murakami	8/23/56
HW-45137	K Reactor IBM Studies	S. R. Stamp	8/30/56

III. PERSONNEL

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A. Organization

There were no appointments within the Reactor Section during August. Effective September 1, 1956, the Reactor Section will be dissolved in line with the Hanford Atomic Products Operation reorganization. All Reactor Section components were absorbed by the new Irradiation Processing Department.

B. Force Summary

	<u>Beginning Of Month</u>	<u>End Of Month</u>	<u>Net Change</u>
Section General	2	2	0
Operations	428	428	0
Project & Special Reactor Maint.	218	217	- 1
Reactor Areas Maintenance	592	594	+ 2
Projects and Personnel	56	54	- 2
Power	494	496	+ 2
Process	79	78	- 1
Radiation Monitoring	109	117	+ 8
Section Total	1978	1986	+ 8

Changes during August included 34 transfers into the Section, 25 transfers out of the Section, 14 new hires, 16 terminations, 1 reactivation, and 0 deactivations.

C. Safety Experience

There were no Disabling Injuries and no Serious Accidents or Incidents during the month of August.

D. Radiation Experience

No Radiation Incidents were incurred during August. Fifteen Lapses of Radiation Control were recorded.

E. Personnel Activities

At month end, 30 employees are receiving on-the-job training for engineering or supervisory assignments in the Section; 25 of these are on assignment under the rotational training program.

R. S. Bell attended an Association Island Conference from July 28 to August 2.

Seven exempt and 43 non-exempt Power personnel attended Post CG-558 Operating Training Classes conducted by the Instructor - Power.

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E. Personnel Activities (Continued)

H. A. Laybourn, Operations Sub-Section, presented two lectures to non-exempt Power personnel on "Power's Role in Reactor Operation."

W. P. Howell and J. S. Corbett, Radiation Monitoring Sub-Section, presented a lecture to exempt personnel of the KER Semi-Works Unit on "The Supervisor's Responsibility for Radiation Protection."

Radiation Monitoring supervision conducted a number of meetings for Operations and Maintenance personnel on Radiation Hazards Topic No. 49, "Radiation Exposure - Hand and Shoe Score Cards."

In the Operations Sub-Section, the seventh, of a series of eight, set of training questions was completed and the eighth set distributed.

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SEPARATIONS SECTION

August, 1956

I. RESPONSIBILITY

Responsibilities of the Separations Section were unchanged during the month. Preparations are in progress within the Sub-Sections for revision of responsibilities in anticipation of the over-all plant reorganization on September 1, 1956.

II. ACHIEVEMENT

A. Operating Experience

1. Statistics

a. Bismuth Phosphate Operations

	<u>August</u>		<u>July</u>	
	<u>Normal</u>	<u>Acid Wash</u>	<u>Normal</u>	<u>Acid Wash</u>
Charges completed-Isolation Bldg.	23	0	89	0
Special charges-Isolation Bldg.	21		14	cleanouts

b. Redox Operations

	<u>August</u>	<u>July</u>
Tons Uranium delivered to storage	105.0	59.8
Average Production Rate per Operating day, tons	6.2	8.5
Average Daily Operating Rate for the month, tons	3.4	1.9
Average yield, %		
Uranium	99.8	99.3
Plutonium	103.7	99.9
Total Waste Loss, %		
Uranium	0.70	0.49
Plutonium	2.16	1.39
Average cooling time (days)	134	124
Minimum cooling time (days)	97	107
Percent down time	46	78

c. Purex Operations

	<u>August</u>	<u>July</u>
Tons Uranium delivered to storage	239.5	112.7
Average Production Rate per Operating day, tons	10.2	9.09

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c. Purex Operations (Continued)

	<u>August</u>	<u>July</u>
Average Daily Operating Rate for the month, tons	7.7	3.63
Average yield, %		
Uranium	99.99	93.0
Plutonium	93.5	80.0
Total Waste Loss, %		
Uranium	0.95	1.16
Plutonium	1.26	2.3
Average cooling time (days)	135	145
Minimum cooling time (days)	116	131
Percent down time	24.2	60.0

d. 231

	<u>August</u>	<u>July</u>
Batches started	31	79
Batches completed	31	88
Batches awaiting processing	0	1

e. 234-5 Operations

	<u>August</u>	<u>July</u>
Batches completed through Task I	388	136
Batches completed through Task II	394	139
Runs completed through Task III	226	54
Waste Disposal (units)	349.37	135.93

f. UO₃ Operations

	<u>August</u>	<u>July</u>	<u>To Date</u>
Uranium drummed, Tons	397.96	474.27	15,753.60
Uranium shipped, Tons	405.19	518.09	15,728.82
Average cooling time, days	140	130	
Minimum cooling time, days	103	113	
Waste Loss, %	0.02	0.02	

g. TBP Operations

	<u>August</u>	<u>July</u>	<u>To Date</u>
Tons received from Metal Removal	161.45	136.11	7,492.53
Tons shipped to UO ₃ Plant	151.57	136.65	7,238.20
Average Production Rate per Operating day, Tons	6.06	4.41	

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g. TBP Operations (Continued)

	<u>August</u>	<u>July</u>	<u>To Date</u>
Average Daily Operating Rate for the Month, Tons	5.26	4.41	
Average yield, %	99.34	99.13	
Total Waste Loss, %	0.86	0.87	
Ratio Actual Waste Volume Returned to Theoretical Volume	96.8	1.02	
Percent Down Time	13.13	0	

h. Power

	<u>200 East</u>	<u>200 West</u>
Raw water pumped, gpm	7 881	6 215
Filtered water pumped, gpm	714	1 136
Steam generated, lbs/hr	99 047	134 447
Maximum steam generated, lbs/hr	161 000	202 000
Total steam generated, M lbs.	73 000	100 028
Coal consumed, Tons (est.)	4 784	6 393

i. Waste Storage

	<u>Equivalent Tons U</u>	
	<u>Aug.</u>	<u>July</u>
Metal Waste reserve storage capacity-T Plant	81	83
1st Cycle reserve storage capacity-T Plant	357	361
Metal Waste reserve storage capacity-B Plant	51	51
1st Cycle reserve storage capacity-B Plant	74	74
Redox Waste reserve storage capacity	2,127	1,148
Purex Waste reserve storage capacity	2,243	2,389

2. Activitiesa. Redox Processing

The original Redox Operation commitment of high MWD material was completed during the early part of the month and a routine flushing program started to convert to low MWD material. However, because of processing problems in the Purex Operation, the facility was requested to remain in standby status to assure that the high MWD commitment for the Separations Section would be met. On August 6, after the initial stages of the flushing program had been completed, the facility was requested to recharge high MWD material. An additional 60 tons of high MWD material was subsequently processed according to schedule along with plutonium rework material which was recovered in the original flushing program.

The return to high MWD material necessitated a second flushing program in order to change from low MWD material.

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b. Metal Recovery

1) TBP Processing

Production was steady except in the last week of the month when low waste removal rates in the tank farm due to pump problems resulted in extraction line shutdown.

2) UO₃ Processing

Limitations were imposed on production the first two weeks due to lack of specification feeds. Mechanical difficulties in the solids handling system and in Luckey Pot No. 20 later in the month curbed production in that period.

3) Waste Metal Removal

Tank cleanout sluicing continued in UR Farm. Regular sluicing operations in 107-TX continued with good removal rates until 8-24-56 when the accumulator tank pump failed. The pump replacement encountered difficulties which resulted in 75 hours of operating lost time due to this removal of equipment. Removal rates following the pump replacement have been satisfactory.

Dual sluicing, in which the 101-TX tank is used as an accumulator, was started on August 16. This plant developed method will allow tank cleanouts concurrent with regular sluicing operations. Operation of the system to date has been good.

In-farm scavenging operations remained shutdown during this month due to the limited waste storage conditions.

c. T Plant

The decontamination and plutonium removal program at T Plant, which was started during the latter part of March, continued during the month of August. All activities have been confined to the decontamination and plutonium removal from the processing vessels in preparation for complete shutdown and lay-away status.

Since the start of the decontamination and plutonium removal program, processing of six standard acid washes and fifty-seven dilute nitric flushes have been completed through the Canyon and Concentration Buildings for a combined recovery of 735% of a standard run. Of this combined total 448% was recovered from the Canyon Building and 287% from the Concentration Building.

The plutonium removal phase of the shutdown and lay-away program has been completed in both the 221-T and 224-T Buildings. Product pickup during the decontamination phase is expected to

1102012

c. T Plant (Continued)

be an insignificant amount and will be discarded. Complete decontamination and lay-away will require about three additional months.

d. B Plant

Decontamination of the failed D-12 concentrator pot which was removed from the Redox Facility is continuing by the use of acid flushes. The radiation levels were reduced to 1500 mr/hr on the outside of the pot and 5500 mrad/hr four feet above the open top.

e. Z Plant

Production activities were essentially suspended during the entire month in the 231 Building. The only material handled consisted of five batches of material from Redox and eighteen of material from Purex which contained from 1 $\frac{1}{2}$ % to 5% of uranium based on plutonium. The uranium was removed by using the standard peroxide precipitation, and the material was then processed through an oxalate precipitation and loaded into filterboats for subsequent handling in the 234-5 Building.

In metal fabrication operations generally progressed satisfactorily during the month. Schedules were somewhat reduced in the early part of the month due to a lack of feed. Later in the month, it was necessary to operate Tasks I, II, and III on an overtime basis during one week-end in order to handle the material being produced by both the Redox and Purex Plants operating simultaneously. The need for expediting the conversion of the Redox Plant to processing low MWD plutonium was also a factor in the scheduling.

f. Purex

Following the flushes and repairs to the plutonium concentrator equipment operations were resumed on August 9, 1956, at a 12 tons per day rate. The failure of product partitioning in the partition cycle on August 19 resulted in the loss of two days of production time.

The over-all decontamination efficiency of the plant has been excellent in spite of rather low decontamination obtained in the second uranium cycle. With the exception of two batches all uranium produced has met specifications at the end of the extraction cycle or after supplemental treatment in Purex silica gel. Plutonium produced was also within specifications except for two batches. Waste losses were 1.26 and .95 for plutonium and uranium respectively. Head

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f. Purex (Continued)

end feed preparation is restricted due to the failure of the replacement E-4 centrifuge on August 26, 1956

Waste tank 241-A-103 has reached boiling temperature and "burps" occur routinely on an average of one each eight hours. Organic waste was routed to 241-C-110 tank to reduce the emulsion problem in the A-8 crib.

3. Special Operations

At the beginning of the month the Purex Plant was in a shutdown status as a result of plugging in the plutonium concentrator package piping. Following plug removal, flushes and repairs, operations were resumed on August 3, 1956. After 12 hours a plug re-formed in the concentrator outlet and the plant was shut down. Again the plug was dislodged and after nitric flushes to remove plutonium, the package and receiver tanks were thoroughly flushed with 20 percent sodium hydroxide. Since operations were resumed no plugging or abnormal plutonium buildup in the package has been observed. Process conditions were changed to exclude water addition to the concentrator for control of acid molarity. Water is believed to contribute to solids formation since plutonium polymer may be formed by its addition.

During the package flushing operations it was determined that the concentrator overheads were discharging into the second acid concentrator feed tank instead of to the 1A column feed tank. Inadequate venting is considered to be the cause of the mis-routing. Since the plutonium content of this stream is almost negligible it is planned to continue operations as is and correct for this condition in the spare package being repaired in M Cell. On August 19 a routine analysis disclosed a failure of partitioning of plutonium and uranium in the partition cycle. The difficulty was traced to an excess flow of sodium nitrite to the 1A column feed tank. Two days production time was lost while the uranium stream was being stripped of plutonium.

Investigation of the Purex A-8 crib showed that the plugging was due to an accumulation of organic oxidization products and an unidentified fungus growth. The minimum condenser water flow has been reduced from 500 gpm to 240 gpm and the effluent water temperature control point was raised from 50° C to 55° C. Since these changes were effected no further overflow of the crib has occurred. As a precautionary measure a 100 foot square, 4 foot deep retention pond has been excavated at the overflow of this crib to retain any contaminated effluent that may discharge.

In the Z Plant the low operating efficiency experienced in the solvent extraction hood was due principally to frequent inversions and column emulsions brought about by excessive impurities in the system. Corrective action involved cleaning and flushing of the primary ANN storage tank to remove an accumulation of solids identified as alumina. The organic (12% TBP in carbontetrachloride)

1102014

3. Special Operations (Continued)

was extremely dirty and several batches had to be discarded. Operating conditions were improving at month-end when the plant was achieving about 80% efficiency. Hood #40 was used intermittently for the recovery of low MWD material originating from the Savannah River Plant. Hood #41 continued on high MWD product.

4. Schedule Variance

In Redox the return to high MWD processing and the necessity of scheduling two routine flushes, which have been found necessary to produce high quality material, delayed the start of low MWD processing such that none of the material scheduled for August was processed.

The TBP Plant produced 119.5 percent of commitment and the UO_3 Plant produced 82.9 percent of commitment. Eleven cars of UO_3 were shipped.

In the Z Plant the low MWD commitment for plutonium nitrate was not met because of the need to operate both Redox and Purex on high MWD plutonium. All goal forecasts for the month were readily met in metal fabrication.

Purex production for the month was 239.5 tons as compared to a commitment of 220 tons.

B. Equipment Experience

1. Operating Continuity

A mechanical efficiency of only 50% was attained in Redox. This low efficiency is largely due to shutting down and flushing the processing equipment twice for conversion from high to low MWD material.

The TBP Plant experienced 79 hours of first cycle downtime and 99 hours of second cycle downtime. This downtime was the result of low feed supplies.

In the Z Plant there were no equipment failures which adversely affected the continuity of operations during the month.

Downtime this month in the Purex Plant totalled $7\frac{1}{2}$ days, not including 2 days of operation when the uranium stream was being recycled. Except for a few hours outage due to power interruptions, all of the downtime was for flushing and repairs to the plutonium concentration equipment.

2. Inspection, Maintenance and Replacement

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a. Redox

Major equipment difficulties encountered in the Redox Facility were the installation of a redesigned drain jumper from the J-6 filter tank, replacement of the E-5, F-1 and H-5 pumps, the D-2 agitator, and 2 AF feed jumper, the D-14 to D-12 vapor line, the D-12 tube bundle trap jumper; and the D-12 to D-10 jet jumper. At month end all of the above items were operating satisfactorily.

b. Purex

In Purex repairs to the plutonium concentrator package included replacement of two steam traps, three diaphragm operated valves and six manually operated valves. While the work was completed in less than two shifts on August 1, three days of preparation were required to test equipment, develop procedures and techniques to prevent personnel contamination. No incident of skin contamination resulted. On August 13 alteration and repair work was begun on the spare plutonium package parked in M Cell. Fifty percent of the work scheduled on this unit was completed.

The replacement E-4 feed preparation centrifuge failed on August 26, after 12 days of normal operational use. The cause of this failure has not been determined, but final instrument readings indicate a motor or bearing failure.

c. Z Plant

Although maintenance was required in all phases of the major Z Plant operating equipment a more than normal amount of repair was required on the Task II equipment. This included the Task II carriage, the balance elevator and repair to holes in one furnace door and the hood bottom which were damaged by corrosion. Corrosion of the furnace door required its replacement. An attempt was made to repair the holes in the corroded hood floor beneath the furnaces by gasketing a special 1/8" stainless steel plate to the bottom of the hood with 3/8" neoprene. Other significant maintenance of the RMA Line included replacement of the heating element and straightening of the vertical lift arm on Unit #2 of Task IV, replacement of bearings and vacuum bellows seals in the hemisphere lathe of Task V, and a complete repair job on the #2 general conveyor.

In the Recuplex Facility the L-8 waste receiver tank was out of service for two weeks during replacement of a bent agitator shaft and dip tubes. Failure of the bellows on the H-1 pulse generators made replacement necessary.

C. Improvement Experience

1. Process Tests and Revisions

Waste Scavenging

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Waste Scavenging

Neutralization of the TBP Plant waste and scavenging treatment with sodium ferrocyanide, nickel sulfate, and strontium nitrate was continued on a routine basis. On August 4 a plant scale test was started in which inert cobalt ($\text{CoSO}_4 \cdot 7 \text{H}_2\text{O}$) was added to the RDIS (intermediate scrub) and nickel sulfate make-up solutions. The test was completed on August 19 after approximately 800,000 gallons of TBP waste had been treated. All of the waste collected in the 42-106-BY tank received this two-point cobalt treatment. Decontamination factors of 100 to 300 were realized during this test; however, the final Co^{60} content was still above the cribbing tolerance set by Radiological Sciences..

During the month the Co^{60} content of the scavenged waste was above cribbing limits on all settling tanks sampled. The radio-cesium and radio-strontium concentrations in these scavenged waste batches were all below the cribbing tolerances.

2. Inventions and Discoveries

There were no inventions or discoveries of a patentable nature reported in the Separations Section during the month of August.

D. Events Influencing Costs.

The Separations Section expenditures for the month of August are expected to be approximately 6% above the July level. This increased expenditure rate is a result, primarily, of increased essential materials associated with the higher production rates achieved by Redox and Purex. Since the button production from the 234-5 Facility established a new high, the unit cost for this product is expected to establish a new record low.

E. Plant Development and Expansion

1. Project Status

a. CA-513-A - Purex Facility

This project is 99.9 percent complete. Only minor work of a non-critical nature remains to be completed except for electrical heater installations on dissolver off-gas systems.

b. CA-513-E - Phase I Purex Expansion

This project is approximately 49 percent complete. Bids for the second crane were opened on August 27 and are now being reviewed.

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c. CG-598 - Purex Vacuum Acid Fractionator

This project is approximately 74 percent complete. A bid package for sub-contraction of piping, mechanical, and insulation work for this facility was scheduled for August 28, 1956. All engineered equipment is now on site.

d. CG-613 - UO₂ Expansion

Project CG-613 was accepted by the Manufacturing Department on August 23 with exceptions. Three calciners and their associated equipment were accepted. Three remain to be completed. The Engineering Department accepted the prototype calciner on July 16 and started test runs with UNH solutions on August 3.

The low bid on the new maintenance shop was \$95,200. A review of the bid package is being made in an effort to reduce the cost of the installation.

Alterations to the seals on the powder screw conveyor for the existing load-out facility are in progress and the installation of the conveyor is scheduled for the week ending September 9.

e. CG-621 - Redox Contamination Control

E Cell Ozonization: Painting and identification of lines and equipment remain to be completed. An operability check and adjustment of controls and safety valves on the compressed air system will be required before the ozone generators can be placed in service. Equipment for the E-13 continuous gamma monitor is on order.

J-6 Precondenser: Identification of valves and equipment and lagging of service piping remain to be completed. The new drain line jumper from the J-6 filter to the tunnel wall did not improve the drainability of the system. Further checks of the system are being made.

Canyon Wash-Down Facility: Pipefitters have now been assigned to the project and fabrication of piping systems are in progress. Cell maintenance work has prevented construction work on the canyon roof.

f. CG-643 - Redox Capacity Increase - Phase III

Revision No. 2 of the project proposal is being held until reorganization is completed.

g. CG-648 - Redox Auxiliary Iodine Removal and Nitric Acid Recovery Facility

Construction of the 293-S Building is proceeding satisfactorily. The floor drain dry well and part of the floor

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g. CG-648 - Redox Auxiliary Iodine Removal and Nitric Acid Recovery Facility (Continued)

drain piping have been installed and pouring of the footings and floor slabs is in progress. Scheduled completion date for the facility is September 15, 1957.

h. CG-644 - Tail End Silica Gel Treatment

Detailed design has been completed by W. C. Nickum & Sons, Architectural Engineers. Final comments have been submitted, which should complete all work on this project.

1. CG-647 - Iodine Removal Back-Up Facilities

Minor Construction has completed their portion of the 293-A structure. The fixed-price contractor will be permitted to start his construction the first week in September instead of October 1, 1956, as called for in his contract.

j. CG-686 - In-Line Monitoring Instruments - Redox and Purex

Detail design of the sampling and monitoring systems is in progress.

2. Plant Engineering

a. Maintenance Program

A study to develop and install maintenance measurements was continued this month. The statistical indices and measurements thus far established and maintained have been reviewed for their relative value. One measurement of special significance was developed from a work sampling study in the Redox Plant to establish the present use of craft labor. An interim report representing the data has been prepared for the Redox Manager.

As a result of further study of the Purex preventive maintenance program, procedures and methods regarding more effective utilization of the equipment history were developed and initiated to yield immediate and future reductions in maintenance costs on equipment. A significant reduction of the total number of previously scheduled equipment inspections resulted from adjustment of their frequencies. All equipment items which comply will be designated and specifically signalled, in the history files, as the items which can only be worked on during shutdowns in order to insure complete preventive maintenance coverage. Outlined in report No. 80 is a recommended method developed for detecting excessive repair costs of equipment items on an annual basis. The report includes a recommended procedure for determining and

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a. Maintenance Program (Continued)

making inspection frequency adjustments on equipment, based at this time on limited history, to eventually provide the proper balance between excessive repairs and excessive inspections.

b. Maintenance of Standards

The analytical service standard was revised for the TBP process. The files on cost standards are being revised to conform with organization changes.

c. Engineering Assistance

Design and Drafting

Progress continues on the over-all as-built drafting program. Items completed during the period include: 202-S Flexible Electrical Connector; 234-5 Coating Tripod Improvements; 200 East Area General Lay-out Map; and Jumper Connector Bail Standardization.

New drawings completed during the period include: Large Lathe Parts Storage; (Rack) Shaft Seals for Continuous Calciners; and Proposed Boilermakers "Burning Table."

F. Reports Issued

1. Routine

<u>Number</u>	<u>Subject</u>	<u>Author</u>
HW-45203	Separations Section Redox Plant Sub-Section Monthly Report - August, 1956	C.T. Groswith
HW-45209	Separations Section Metal Recovery Sub-Section Monthly Report - August, 1956	T. Prudich
HW-45489	Separations Section T Plant Sub-Section Monthly Report - August, 1956	C.B. Foster
HW-45129	Separations Section Z Plant Sub-Section Monthly Report - August, 1956	L.I. Brecke
HW-45171	Separations Section Radiation Monitoring Sub-Section Monthly Report - August, 1956	D.R. Koberg
HW-45156	Separations Section Projects and Personnel Development Sub-Section Monthly Report - August, 1956	O.V. Smiset
Official Use Only	Separations Section Power & Maintenance Sub-Section Monthly Report - August, 1956	C.P. Cabell
HW-45157	Separations Section Purex Sub-Section Monthly Report - August, 1956	V.R. Chapman
HW-44923	L Cell Package Experience	C.R. Anderson By F.T. Keenan

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1. Routine (Continued)

<u>Number</u>	<u>Subject</u>	<u>Author</u>
HW-44755	Z Plant Test Authorization for August, September, and October, 1956	W.G. Browne K.M. Harmon
HW-44874	Accountability Factor for Calculating Savannah River Delta Phase Plutonium	W.G. Browne
HW-44881	Inspection Report Tool #200-PSH-7 & 8	M.C. Jacobs
HW-44928	Inspection Report Tool #250-PSH-10, and 11	M.C. Jacobs
HW-44992	Inspection Report Tool #200-PSH-9, and 10	R.E. Vandercook
HW-44723	Essential Materials Consumption for TBP Plant, July, 1956	M.A. Thress
HW-44724	Essential Materials Consumption for Redox Plant, July, 1956	M.A. Thress
HW-44725	Essential Materials Consumption for Purex Plant, July, 1956	M.A. Thress
HW-44726	Essential Materials Area Report to Cost and Purchasing, July 1 through July 31, 1956	M.A. Thress
HW-44727	Essential Materials Planning - August 1, through August 31, 1956	D.E. Peterson
HW-44860	Separations Section Waste Status Summary for July, 1956	D.E. Peterson
HW-44728 RD	TBP-UO ₂ Bldgs. Production Schedule for August, 1956	H.F. Tew
HW-44728RD2	Revised TBP-UO ₂ Bldgs. Production Schedule for August, 1956	H.F. Tew
HW-44729 RD	202-S Building Production Schedule for August, 1956	H.F. Tew
HW-44729RD2	Revised 202-S Building Production Schedule for August, 1956	H.F. Tew
HW-44730 RD	Purex Plant Production Schedule for August, 1956	H.F. Tew
HW-44730RD2	Revised Purex Plant Production Schedule for August, 1956	H.F. Tew
HW-44731 RD	Z Plant Production Schedule for August, 1956	H.F. Tew
HW-44731RD2	Revised Z Plant Production Schedule for August, 1956	H.F. Tew
HW-44854 RD	Six Month Goal Forecast, August, 1956	H.F. Tew
HW-44854RD2	Revised Six Month Goal Forecast, August, 1956	H.F. Tew
HW-45068 RD	Official Quarterly Forecast, Chemical Processing Department, September 1, 1956 through June 30, 1961	H.F. Tew
None	Status of Projects, Informal Requests and Budget Items, August, 1956	V.D. Rouse
None	Separations Section Space Occupancy Report, August, 1956	V.D. Rouse

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2. Non-Routine

<u>Number</u>	<u>Subject</u>	<u>Author</u>
HW-45095	Radiation Incident Investigation Number 618-C	G.E. Backman
None	Steam Standard for the Purex Plant	G.R. Ruzicka
None	Cask Car Contamination Control	A.C. Morgenthauer
None	Addendum to the Redox Preventive Maintenance Program Report - Equip- ment Economics - Preventive Maintenance System	M. Pociluyko
None	Cost Reduction Study 200-W Laundry	R.H. Silletto
None	Analytical Service Standard for the 221-U Building	R.H. Silletto

III. PERSONNEL

A. Force Summary

	<u>Start of Month</u>	<u>End of Month</u>	<u>Net Change</u>
Section General	1	1	0
Redox Plant Sub-Section	222	223	+1
Metal Recovery Plant Sub-Section	260	263	+3
Z Plant Sub-Section	182	178	-4
T Plant Sub-Section	42	31	-11
Purex Plant Sub-Section	256	253	-3
Power & Maintenance Sub-Section	307	304	-3
Projects & Personnel Development	56	57	+1
Analytical Control Sub-Section	220	216	-4
Radiation Monitoring Sub-Section	162	160	-2
Section Total	1708	1686	-22

B. Safety

There were no disabling or medical treatment injuries during the month and no near serious accidents occurred.

C. Radiation Experience

One radiation incident was investigated formally during the month. In the 234-5 Building, a process operator was exposed to plutonium air contamination when he transferred packaged slag and crucible cans from a box to a larger plastic bag in preparation for Recuplex dissolver charging. The employee was not wearing the required respiratory protection equipment at the start of the work, and initial bioassay urine sample results indicate that some deposition of soluble plutonium occurred.

In the Redox and Purex facilities insignificant iodine emissions averaged less than 0.04 curies per day. The maximum per day was 0.27 curies with

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C. Radiation Experience (Continued)

only 3.3 curies being emitted during the month. Metal age has been in the range of 97 to 153 days.

D. Personnel Activities

Visitations

On August 17, J. R. Huston and W. E. Johnston of the Westinghouse Electric Corporation and H. F. Hatfield, S. C. Townsend, and R. G. Trout of the Pennsylvania Power and Light Company, were in the Purex Plant under the auspices of the AEC to confer on remote maintenance methods used in Separations Plants and their possible application for power reactors.

On August 21 Mr. E. Roszkowski of the AEC New Jersey Standards Laboratory, New Brunswick, N.J., visited the Redox Laboratory to study laboratory practices for preparation of standard Pu solutions.

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ELECTRICAL UTILITY SECTION

August, 1956

I. RESPONSIBILITY

There were no changes in Section responsibility.

II. ACHIEVEMENT

A. Operating Experience

Power Statistics (See last page for details)

Plant Contract

Probable time of August maximum demand.5:30 - 6:00 p.m., August 25, 1956	
Telemetered maximum demand for August.....	190,800 KW
Probable billing demand for August.....	190,800 KW
Probable energy consumption for August.....	124,383 MWH
Actual BPA metered maximum demand for July.....	185,801 KW
Actual billing demand for July.....	190,000 KW
Actual energy consumption for July.....	120,935 MWH
Average monthly energy consumption-1 month of	
Fiscal Year '57.....	120,935 MW
Cost of purchased electricity for July.....	\$277,758
Actual cost of purchased electricity for 1 month	
of Fiscal Year '57.....	\$277,758

* * * *

The unusually heavy thunder storm which prevailed over a large part of the Project and surrounding area the evening of August 23 caused no major disturbances to the electrical system. Normal power to the 300 Area was off momentarily when lightning struck the 115 KV transmission line and terminal circuit breakers functioned to clear the fault. The Hanford Substation was out of service for approximately two hours when lightning struck the 7200 V. tertiary circuit and damaged current transformers. Several heavy surges were apparent on the 230 KV system; however, no effect to 100 Area production was reported.

* * * *

Manhours expended this month on standby and escort services for CG-558 construction activities was much heavier than recent experience due chiefly to the coincidence of excavation under or near electrical power lines in 100-B, 100-T, and 100-H. Absence of excavation and near electrical power lines in 100-B, 100-T, and 100-H.

B. Equipment Experience

B. Equipment Experience Cont'd.

Two 230 KV oil circuit breakers in the 251 Substation were overhauled. Breaker Number A-384 was found to be in good condition and required only minor adjustments. Inspection of breaker Number A-382 revealed a broken oil piston spring on an interrupter unit and the entire unit was replaced with a spare to avoid the additional time of dismantling during overhaul. Further checking revealed a grounded capacitor unit and this was also replaced with a spare. Major overhauls of two other 230 KV breakers are planned during this fiscal year.

D. Events Influencing Costs

The Morton Supply Company of Yakima bid \$8,230 to salvage the remaining 66 KV transmission line between the 300 Area and the Hanford Substation. The West Richland Supply Company's bid of \$1,346 to salvage the remaining distribution lines in and about the Hanford Area was accepted. Both contractors have begun the removal of materials.

* * * *

Overtime hours expended were 2.9 per cent of the total available hours.

Attendance for the month was 97.27 per cent.

E. Plant Development and Expansion

CG-558 - 100-F Area: The electrical switchgear and breakers for substation additions arrived during the month and was uncrated and moved into the building. Substation electricians drilled the necessary holes in the concrete floor for the new conductor entrance into the building. It is planned to have equipment connected so that the first motor can be tested early in October.

CG-558 - 100-H Area: Minor Construction forces completed pouring the concrete floor which will accommodate new switchgear procured for the 151-H Substation.

CG-558 - 100-D Area: Utility forces have been assisting Minor Construction in the test runs of four motors.

Minor Construction completed the installation of the steel tower structure replacing the wooden secondary structure of the R-side transformer in the 151-D Substation. This was done in order to support switches and conductors for the new third transformer.

* * * *

CA-586 - Third 230 KV Line: All major construction work on this project was completed and Utility forces made a preliminary check of the carrier relaying. The in-line steel tower near Gable Mountain will be erected by Utility forces the end of September.

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F. Significant Reports

"Westinghouse 115 KV DBA Fuses," by G. A. Zeitler, dated August 20, 1956.
An analysis of failure in this type fuse, with recommended testing, storage, and maintenance methods.

III. ORGANIZATION AND PERSONNEL

A. Organization

No changes in structure or nomenclature.

B. Force Summary

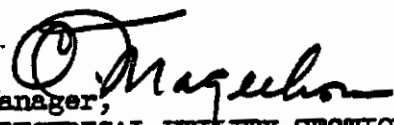
	Beginning	Ending	Net
Exempt Personnel	17	17	0
Dispatchers	5	5	0
Electricians	11	11	0
Linemen	21	21	0
Substation Operators	33	33	0
Secretary	1	1	0
Stenographer	1	1	0
Clerks	2	2	0
Draftsman	<u>1</u>	<u>1</u>	<u>0</u>
	92	92	0

C. Safety Experience

No disabling injuries occurred during the month, one medical treatment injury was reported.

D. Radiation Experience

No incidents were reported during the month.


Manager,
ELECTRICAL UTILITY SECTION

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POWER STATISTICS
ELECTRICAL UTILITY SECTION
FOR MONTH ENDING AUGUST 31, 1956

744 Hours

	ENERGY - MW HRS.		MAXIMUM DEMAND-KW		LOAD FACTOR-%	
	Last Month	This Month	Last Month	This Month	Last Month	This Month
230 KV System						
A-2 Out (100-B)	29180	28090	49100	47800	79.9	79.0
A-4 Out (100-D)	16100	18430	29600	32600	73.1	76.0
A-5 Out (100-H)	8550	9180	15600	16300	73.7	75.7
A-6 Out (100-F)	6570	8050	13100	13500	67.4	80.1
A-7 Out (100-KW)	25581	24336	38000	39500	90.5	82.8
A-8 Out (200 Area)	6760	6980	10650	11100	85.3	84.5
A-9 Out (100-KE)	23760	24336	40000	41000	79.8	79.8
TOTAL OUT	116501	119402	196050*	201800*	--	--
MIDWAY IN	118200	121740	182400	187200	87.1	87.4
115 KV System (300 Area)						
BB3-S4 Out	2512	2472	4320	4320	78.1	76.9
115-66 KV System						
7-S10 Out (W. Bluffs)	156	168	630	630	33.3	35.9
Hanford Out (7200 V.)	22	22	--	--	--	--
Hanford In	157	171	900	900	23.4	25.5
Project Total In	120869	124383	187620*	192420*	--	--

* Denotes Non-Coincidental Demand

Average Power Factor - 230 KV System 87.1

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PURCHASING AND STORES SECTION

AUGUST, 1956

I Responsibility

Effective August 13, 1956 responsibility for procurement of construction general supply items was transferred from the Company to J. A. Jones Construction Company.

II Achievement

STATISTICS

	<u>June</u>	<u>July</u>	<u>August</u>	<u>FY 1956 Average</u>
<u>Purchasing</u>				
Emergency req'n rec'd.	276	294	266	361
Average per day	13.1	14	11.5	17.1
Purchase orders placed				
Number	2,014	2,365	2,287	2,416
Value	\$1,549,646	\$1,521,159	\$1,757,653	\$1,973,686
Purchase order alts.				
Number	275	350	355	286
Value	\$ 139,272	\$ 120,459	\$ 195,790	\$ 241,553
<u>Stores</u>				
General Supplies				
No. of store orders	34,644	23,647	28,985	30,402
Value of issues	\$ 419,630	\$ 254,554	\$ 356,273	\$ 328,645
Spare Parts				
No. of store orders	1,843	974	1,206	1,524
Value of issues	\$ 131,074	\$ 105,075	\$ 114,477	\$ 125,304
<u>Traffic</u>				
Savings freight bill audit	\$ 863	2,612	\$ 1,566	\$ 1,718
No. freight bills approved	1,253	1,118	1,595	1,543
Amount	\$ 215,464	\$ 187,403	\$ 290,581	284,655
Carload shipments received	537	587	846	832
Tonnage report				
Tons rec'd-common carrier	35,377	34,866	54,851	53,813
Total cost	\$ 210,465	\$ 270,738	\$ 301,405	\$ 308,758
Average cost per ton	\$ 5.949	\$ 7.765	\$ 5.495	\$ 5.782

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II Achievement (Cont.)

Extended Orders Placed

Emulsified Asphalt requirements placed for 1-year period, 120,000 gallons, \$14,100.

Projects

Project CG-558 - Reactor Plant Modification for Increased Production

As of this date, there are 27 open purchase orders and three requisitions in process. Of the open orders, five are being handled by the off-plant group. All orders on this project are scheduled for completion as required with the exception of order H6T-11773 on Titeflex, Inc. This order is the one remaining trouble spot and the vendor is forwarding a shipping schedule of items one and two to be shipped 10-20-56 and items three and four to be shipped 11-20-56. This schedule is extremely tight and off-site liaison is following the order closely.

Project CG-621 - Redox Contamination Control Facilities "E" Cell Ozonization

There are ten open purchase orders as of this date, four of which are being handled by the off-site group and are scheduled for completion within our required dates.

Project CG-647 - Back-Up Radioiodine Facilities, Purex

As of this date, there are 37 open purchase orders and 1 requisition in process. Of the orders open, 7 are being handled by the off-site groups. Two limiting orders are quite critical at this time, H6V-13861 with Lummus Company and H6V-10715 with Consolidated Western. Arrangements were made by the off-site liaison group with Lummus to furnish all plant materials necessary for their order. Shipment of this material will start immediately. Order H6V-10715 with Consolidated Western is now receiving the vendor's concentrated attention. Purchasing has suggested and insisted the vendor proceed with fabrication of one tray immediately to determine affects of annealing after pre-forming. This was agreed to by the vendor. Close contact is being maintained on all other CG-647 vessel orders, and results to date are satisfactory.

Project CG-648 - Auxiliary Radioiodine Removal and Nitric Acid Recovery Facilities

There are 25 open purchase orders and 1 requisition as of this date. Of the open orders, six are being handled by the off-site group. Order H6V-10711, Consolidated Western, is the limiting order on project CG-648 and work such as welding of coils is proceeding at a rapid rate. Much effort has been expended on expediting fittings and sub-rings for this order.

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II Achievement (Cont.)

Project CG-676 - Fuel Element Pilot Plant Semiworks

As of this date, there are 16 open purchase orders and 19 requisitions in process. Of the open orders to date, the off-site group is expediting one order, HA-56-3861, with Ajax Engineering Company, on which the Commission requested General Electric to perform expediting work. It appears now that the orders placed to date are scheduled for completion well within our requirements.

A request was received from the engineering people in 100-B area for assistance in locating a vendor for a number system on process tubes in the "C" reactor. The numbers will be applied to the gas shields on the front face and deflection plants on the rear face of the 105-C pile. The numbers are required to be visible to a TV camera and resistance tube. A vendor was successfully located and a requisition is in the process of being written.

Failure of motor mounting on centrifuges in Purex was experienced during the month and several contacts were made with the original vendor, The Bird Machine Company, to replace the existing rotors. A request for replacement rotors is in the process of being written and negotiations to determine responsibilities of the failed rotors will continue, including a visit from vendor representatives at Hanford during September.

The steel industry announced an across-the-board price increase which became effective in early August. The price increase of 6-1/4% applying to stainless steels will be reflected in future procurement of stainless process vessels and equipment.

Consolidated Western Steel wrote on August 28, 1956, requesting payment of \$4,123.29, which represents their expenditures for overtime in meeting their shipping promise on the first absorber tower of two ordered on HWC-10928. The requested payment will be denied on the grounds that they were in default at the time the overtime was expended.

The I. & E. cap and heavy base can program interrupted by Alcoa's strike is again operating. Of the 8,000 caps ordered for this program, 3200 have been received, 1500 are enroute by rail express and the balance of 3300 are to be shipped from Edgewater, New Jersey, today via carloading. Additional orders for 82,500 of both I. & E. caps and heavy base cans have also been placed and scheduled for delivery so as to prevent interruption in this program.

The stainless steel spacer tubing on order with Electric Steel Foundry Company and scheduled to be shipped by Carpenter Steel from Union, New Jersey, week of August 20, was to have been inspected August 31, and is now promised for shipment no later than September 7, assuming material passes inspection.

II Achievement (Cont.)

Experimental Orders on Caps and Cans

Harvey Aluminum (caps)

This order is now complete with a total of 111,000 caps received. It still may take as long as eight more months for complete production evaluation before Harvey Aluminum can be used as a competitive source of supply for caps.

Harvey Aluminum (cans)

The second shipment of 4,000 cans requested for preliminary test purpose was promised for shipment August 17; however, it has now been rescheduled for shipment in September.

Hunter-Douglas

(Caps) A total of 15,400 caps received to date and vendor is producing the balance of the order at the rate of about 9,000 per week.

(Cans) The 1200 cans being pile-tested will be removed in September; if results are satisfactory, vendor will be requested to complete order.

Reynolds Metals Company

These orders were placed in May, 1955, and to-date they have not produced any acceptable components.

Alcoa, as a result of the recent strike settlement, has increased prices 8%; the second increase this year. The first increase was effective April 23, 1956, and amounted to 3.76% increase on regular cans and 3.91% increase on regular caps. The April increase was explained by Alcoa as necessary to offset increased freight rates on raw materials, higher costs of purchased materials, increased costs of providing plans and equipment in their experimental program and in replacing obsolete facilities.

One Seal Bid Sale (No. P.S.-10-56) was held during August, consisting of two (2) lots of transmission lines (approximately 535,000 feet of copper and aluminum wire) including poles, line hardware and transformers. This sale brought in a total return of \$9,576. Since May 23, 1956 a total of 10 sales conducted by Stores have been completed with a total sales return of \$509,613.

The Stores daily Dock Report was discontinued August 23, 1956, and was replaced by an IBM card which shows the purchase order number, date material received, and the abbreviated name of the shipper. The change to the IBM card has been very well accepted and provides for the immediate reporting to Expediting of shipments received by Stores. The change not only benefits both GE and AEC Expediting, but will result in a savings in time and money to the Stores operation.

An initial step has been taken towards liquidating the cost of Receiving operation. Effective August 24, 1956, co-author copies of all receiving reports will be processed to accumulate the dollar value of material and equipment received at HAPO. Receipts will be divided into three categories; (1) essential materials, (2) general supplies and (3) spare parts and direct charge. A liquidation factor has been developed for each of

II Achievement (Contd)

these categories and receiving will be given credit for the dollar value of material received based on these factors. Liquidation of receiving expenses will provide an opportunity to further analyze operating costs and make cost reductions where refinements in operating procedures permit.

To assist the new management of Kadlec Hospital in procurement of medical supplies effective September 10, 1956, a complete set of Stores traveling requisitions has been furnished to them. These requisitions cover each item description, quantities procured, unit price and vendor's name.

In addition, medical supplies to be transferred to the new hospital administration have been segregated from those to be retained for use by Industrial Medical and Biology Sections. Ten General Supplies Warehousing personnel have been assigned to take an inventory on September 7, 1956 of the medical supplies to be transferred to the new hospital administration.

The installation of lights over parts bins in the automotive warehouse located in the 1171 Building was completed on Wednesday, August 22, 1956. The installation definitely has eliminated a very unsatisfactory lighting situation in this location.

Contracts executed during month

RO-31

Seller: Stauffer Chemical Company
Material: Sulphuric Acid; Min. 1500 tons, max. 6000 tons
Term: 6-1-56 to 5-31-57
Price: \$146,196 - \$24.3666 per net ton f.o.b. Seller's tank cars, Tacoma, Washington.
Status: Mod. No. 1 which permits an alternate method of shipment has been signed by all parties.

RO-32

Seller: Allied Chemical & Dye Corporation/General Chemical Division
Material: Nitric Acid - Min. 9720 net tons HNO_3 - Max. 26,250 tons Basis 100%
Term: 5-1-56 to 4-30-59
Price: \$1,893,654 total, \$66.92 per ton first year, \$75.00 per ton second year, \$80.00 per ton third year, f.o.b. Buyer's tanks
Status: Contract has been signed by all parties.

RO-33

Seller: Allied Chemical & Dye Corporation/General Chemical Division
Material: Aluminum Nitrate Nonahydrate (Basis 96% Assay)
Minimum 2000 tons; Maximum 17,650 tons
Term: 5-1-56 to 4-30-59
Price: \$1,157,733 total, \$60.79 per ton first year, \$61.56 per ton second year, \$77.95 per ton third year, f.o.b. Buyer's tanks
Status: Contract has been signed by all parties.

I Achievement (Contd)

SA-13

Seller: McCray Marine Construction Company
Service: Diving Service
Term: 8-1-56 to 7-31-57
Price: \$167.10 per day plus transportation, subsistence and overtime.
\$10,000 maximum.
Status: Contract has been signed by all parties.

MRO-4

Seller: Charles Bruning Company, Inc.
Service: Servicing and repairing reproduction equipment
Term: 7-1-56 to 6-3-57
Price: \$90.45 per service call; maximum \$361.80
Status: Contract has been signed by all parties.

No. 145

Consultant: George W. Watt
Service: Consultant on problems relating to research, development and
plant technology.
Term: 9-1-56 to 8-31-57
Price: \$200 per day worked; transportation costs, subsistence
Status: Contract has been executed by all parties.

DDR-6

Seller: Allegheny Ludlum Steel Corporation
Material: Zircaloy Tubes
Term: Complete within approximately 33 weeks after the date of the
first shipment of zircaloy billets from Buyer.
Status: Contract has been signed by all parties.

III Organization and Personnel

<u>Force Summary</u>	<u>Ex.</u>	<u>N.E.</u>	<u>Total</u>
July 31, 1956	61	227	288
August 31, 1956	60	226	286

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**TRANSPORTATION SECTION
MONTHLY REPORT
AUGUST 1956**

Transportation Section personnel forces decreased from 490 to 486 by one new hire, one reactivation - personal illness, two terminations, three transfers out, and one deactivation - personal illness.

Transportation Section gross operating costs for the first seven months of CY 1956 totaled \$2,365,010 and were \$35,065 or 1.55% over the same period in CY 1955. The following indicates comparative costs by major service functions:

<u>Function</u>	<u>CY 1956 1st 7 mos.</u>	<u>CY 1955 1st 7 mos.</u>	<u>% of Change</u>
HW Rail System	\$ 445,009	\$ 424,357	/ 4.87 %
HW Bus System	830,275	793,682	/ 4.61 %
HW Light Equipment Fleet	340,374	372,324	- 8.58 %
HW Heavy Equipment Fleet	386,032	349,470	/ 10.46 %
HW Road System	72,088	48,645	/ 48.19 %

Performed follow-up action on the audit of Transportation Inventories. Special attention was given to the physical safeguarding and accountability control on diesel and antifreeze.

Completed the physical inventory program for CY 1956 on all materials under the custody of the Transportation Section. This action was concluded with the physical inventory of automotive and heavy equipment parts, railway equipment parts, and antifreeze, on August 7 and 8. Percentage of variance to disbursements was 0.8% compared to 1.3% in 1955.

Developed quantitative data on gasoline as to purchases, consumption, and inventory for the second quarter of CY 1956. This information is to be submitted to the State of Washington for a tax refund of \$.065 per gallon on all on-plant consumption. Total disbursements of 294,830 gallons by the Transportation Section during this period will realize a refund of approximately \$19,000.

Handling charges of \$55,000 were billed to the Transportation Section during FY 1956 on materials procured from the Stores Sub-Section. Effective with the reorganization, the handling charge will be revised to include the liquidation of purchasing and receiving costs. This change will mean additional charges of about \$35,000 annually which with increased material costs (from price and volume) and higher salary rates makes the financial situation quite stringent with regard to budgeted funds, unit costs, and liquidation rates to customers.

Considerable effort was concentrated on financial and property matters in connection with the transition to the forthcoming reorganization.

The Field Surveys Unit of the Engineering Department used the boating service of the Richland Tug and Ferry Company from August 7 through August 20. This was the initial activity under Special Agreement No. SA-8, Prime Contract No. W-31-109-Eng-52. The Transportation Section has been delegated administrative responsibility for the performance of work under this contract.

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The annual report on landlord properties was completed for the Consolidated Transportation Facility, 600 Area, Riverland, Unassigned Service Area, and the 3000 Area Equipment Storage.

Disposal papers are in process to remove from record one D-8 dozer blade (63A-2848) and one 2" water pump (49-3380). This action follows the recent physical inventory of the HO fleet which properly accounted for 2472 units of motor vehicles, heavy equipment, and railroad stock. These are the only units that were not actually checked and it is believed they have been non-existent for some time.

Annual Motor Vehicle Reports required by the AEC Manual have been completed at the request of, and in cooperation with, the Commission. Data for FY 1956 were concluded with the development of Schedule 84 which provides statistical information as to the number of vehicles on hand, acquisitions, disposals, replacements, etc. These reports are for the General Services Administration and the Bureau of the Budget. All governmental agencies controlling government owned equipment are required to compile information of this kind.

All new units of light equipment for FY 1956 have been placed in service. The replaced vehicles, except one contaminated unit, have been excessed and are awaiting disposal in the Stores Sales Yard.

Completed an extensive report of new car service required by the 155 new sedans and the 133 new pickup trucks. This information was compiled at the request of the Commission in support of the Government's claim to the Ford Motor Company for the correction of numerous deficiencies.

Thirty-one units from the HOO Reserve Construction Equipment Pool have been delivered to the Excess yard for the September auction as requested by the Commission. The additional matter of preparing 67 units for long-term storage is progressing satisfactorily.

Recommended actions evolving from Disabling Injury No. 56-115 have been executed except for the installation of oscillating lights on three of the eight locomotives. This phase has been delayed by contamination.

A special traffic safety film entitled "What is Your Eye-Q" was presented to approximately 350 employees in 12 showings. Each employee marked a check sheet for the 15 driving situations portrayed in the film. Receptiveness was good and produced favorable comments.

A series of special safety meetings have been conducted for all Lube and Tiremen on the many hazards involved in handling wheels, rims, and lock rings plus the importance of proper matching, inspection, removal, and installation practices.

New tools have been acquired to simplify and realize maximum efficiency in adjusting headlights on automotive equipment. All passenger carrying buses have been checked resulting in a noteworthy improvement in visibility. This service is being integrated into the preventive maintenance program and will provide a uniform headlight adjustment for all highway vehicles.

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The Transportation Section has operated 320 days since the last disabling injury. Medical Treatment Injuries for the first eight months of CY 1956 are down 48% over a year ago.

Completed the movement of the former First Aid Building in White Bluffs to Hanford. The facility will serve as a headquarters for Road and Track Maintenance personnel. This location is conducive to greater productivity and the new arrangement is expected to provide other desirable features.

Further analysis of service station operations in the 700, 1100, and 300 Areas has disclosed that operating schedules can be revamped to require two less men and still provide satisfactory service. Customers have been advised of these changes which are to be effective September 3. This follows an earlier reduction of one employee in January 1955.

Through continuing study it has been determined that track maintenance forces can be reduced by eight people or 15% and such action is scheduled for September 28. This favorable situation stems from several years of highly effective maintenance and rehabilitative effort which has brought the trackage up to the desired standard. It is contemplated that this condition can be maintained by the continuation of progressive programming and scheduling of work which has led to more efficient use of equipment and greater productivity from manpower. This follows an earlier reduction of two men in January 1955 whereas active track miles have increased from 139 to 154.

Commercial rail traffic during August increased 82% over July with the resumption of normal coal receipts following the Coal Miners' Annual Holiday. The following recapitulation indicates the distribution of commercial cars handled:

<u>Cars Handled</u>	<u>Loads In</u>	<u>Empties In</u>	<u>Loads Out</u>	<u>Empties Out</u>
General Electric Company	931	16	14	970
U. S. Army	34	0	0	33
J. P. Head Co.	0	0	0	1
Anning Johnson Co.	2	0	0	3
L. W. Vail Co.	<u>2</u>	<u>0</u>	<u>0</u>	<u>2</u>
Total	969	16	14	1,009

Railroad process service during August increased 36% over July but was still below normal due to production difficulties.

Railroad car movements consisting of process, commercial, and special service, totaled 2194 in August compared to 1469 in July, 1935 in June, 2092 in May, 2548 in April, 2163 in March, 2635 in February, and 2278 in January.

Received the new multiple wear wheels for cask cars which had been delayed by the steel strike. Three axles equipped with these new wheels are yet to be installed to complete the change-out program on the ten original cask cars.

Maintenance of railroad trackage and associated activities required 6,601 man-hours. An additional 97.6 man-hours were utilized for the removal and restoration of trackage at 151-C and 183-B to permit the installation of underground lines by contractor forces on contract AT (45-1) 1133.

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FC-2

RECAPITULATION

The Plant Bus System transported 6% more passengers in August than in July. The following recapitulation indicates the volume of service rendered:

Total Passengers	170,199
Revenue - Bus Fares	\$ 8,443.96
Earnings - Transit Advertising (July)	\$ 175.36
Bus Trips	6,602
Bus Miles - Passenger Carrying	209,486
Passenger Miles	5,992,736

Previous reports have summarized several refinements in the bus operation relative to safety, efficiency, and improved customer satisfaction. A study of FY 1956 figures shows that while these changes were being made the number of passengers transported increased 15% over FY 1955 compared to an increase in bus miles of 7.5% and a decrease in the operating cost per mile of 4.7%.

Off Plant chauffeured automobile trips (Company business and/or official visitors) totaled 115 which were rendered to the following locations:

AEC Airport	1
Benton City, Washington	8
Hinkle, Oregon	10
Kennewick, Washington	34
Pasco, Washington	24
Pendleton, Oregon	14
Prosser, Washington	4
Spokane, Washington	1
Sunnyside, Washington	6
West Richland, Washington	5
Yakima, Washington	7
Burbank, Washington	1

The following tabulation indicates in gallons the volume of fuel distribution during August:

	<u>Gasoline</u>	<u>Diesel Fuel</u>	<u>50 Cetane</u>	<u>Kerosene</u>	<u>White Gas</u>
Stock at Start of Month	63,257	21,225	11,650	9,580	328
Received During Month	109,045	21,666	40,187	0	220
Disbursed During Month	106,037	19,656	37,037	970	186
Stock At End Of Month	66,265	23,235	14,800	8,610	362

The following tabulation indicates the volume of equipment maintenance activities during August by types of service and number of jobs:

Motor Overhauls	42
Class A Inspections and Repairs	87
Class B Inspections and Lubrications	1226
Weekly Inspections - Fuel Trucks and Off Plant Vehicles	89
Semimonthly Inspections - Buses	278
Monthly Inspections - Railroad Rolling Stock	15
Front End Alignment and Wheel Balance	146
Routine Maintenance Repairs and Service Calls	2101
Body Repairs	73
Tire Repairs	586
Wash Jobs	447
	<u>5,090</u>

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The following tabulation indicates the number of HO mileage vehicles in service during July and the utilization of each type:

<u>Code</u>	<u>Type</u>	<u>No. of Units</u>	<u>Total Mileage</u>
1A	Sedans	369	460,104
1B	Buses	162	203,698
1C	Pickups	432	212,115
1D	Panel, Carryall, Sta. Wagon	182	110,723
1G	Jeeps	2	1,426
1H	Power Wagons	48	16,562
68 Series	Trucks	<u>194</u>	<u>87,675</u>
Total		1,389	1,091,785

Covering contamination in the 200-West Area required 2 tons of MC-5 oil, 20 cubic yards of 5/8" chips and 80 man-hours. Surfacing of grounds in the 100-K and 200-West Areas required 232 tons of 1/4" pre-mix and 151 man-hours.

Maintenance of Plant roads and the production of road aggregate materials required 2175 man-hours.

The following tabulation indicates in tons the volume of asphaltic material handled during August for Road Maintenance:

	<u>MC-3</u>	<u>MC 5</u>
Stock at Start of Month	28.71	12.39
Received During Month	75.9	0
Used During Month	104.5	12
Stock at End of Month	.11	10.39

The following tabulation indicates the volume of mineral aggregate and pre-mix material handled in August for Road Maintenance:

	<u>Pre-Mix</u> <u>1/4" to 0</u> <u>Tons</u>	<u>Pre-Mix</u> <u>3/4" to 0</u> <u>Tons</u>	<u>Chips</u> <u>1/2"</u> <u>Cu.Yd.</u>	<u>Chips</u> <u>3/4"</u> <u>Cu.Yd.</u>	<u>Crushed</u> <u>Rock</u> <u>1/4"</u> <u>Cu.Yd.</u>	<u>Crushed</u> <u>Rock</u> <u>5/8"</u> <u>Cu.Yd.</u>
Stock at Start of Month	303	206	895	4,665	814	3,185
Made During Month	11,183	834	0	0	0	3,375
Used During Month	752	6	0	130	748	5,144
Stock at End of Month	734	1,034	895	4,535	66	1,426

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ENGINEERING DEPARTMENTAUGUST 1956PILE TECHNOLOGY SECTION

A research and development contract was signed during the month by Allegheny-Ludlum Steel Corporation for the development of quantity production fabrication techniques for the manufacture of ribbed zirconium process tubes.

The average welding yield for I & E slugs has risen from about 40 per cent to 80 per cent. The increase results from improved braze layer quality and several refinements of the welding technique.

The automatic data taking and recording system recently installed on the DR neutron spectrometer was used to establish definitely the existence of a neutron induced fission process in Pu-240 in a resonance near thermal energy.

SEPARATIONS TECHNOLOGY SECTION

Studies involving the use of low and high acid flowsheets in the Purex process are demonstrating the possibility of obtaining complete decontamination of products in two cycles of solvent extraction. Studies are continuing on the recovery of cesium from wastes containing large amounts of aluminum.

DESIGN SECTION

During August, document HW-44942, "A Preliminary Examination of a Helium Cooled Graphite Moderated Production Reactor Concept", was issued summarizing the results of the first stage of a study to determine the feasibility of a gas cooled reactor for the co-production of plutonium and electric power. Other reactor design development activity during July included studies of modifications necessary to sustain higher process water flow rates in the 100-K Area, studies of improvements to vertical safety rod system components in existing reactors, and evaluation of prototype temperature monitoring and flow monitoring system components.

Studies were continued during the month of building and equipment modifications which would be required to provide for a Phase IV capacity increase in the Redox Plant.

Scope studies were initiated during August for the installation of a second button line in the RG line area in the 234-5 Building.

Work continued during the month on the preparation of a limited scope package for a new plutonium producing reactor embodying a recirculation cooling system (Project CG-654). Design criteria for the following items were approved by the Design Council during August: process water system; thermocouple system; heating, ventilating and air conditioning; power calculator system; basic reactor building requirements; and metal charging system.

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HW-45115

PROJECT SECTION

The responsibilities for procurement of construction materials, warehousing, material control and other related functions were transferred to the J. A. Jones Company on August 13, 1956. The procedures for the above operations were approved and are presently in effect. Minor Construction work assignments were continued on a priority basis. New assignments were received on one project and 32 work orders. The total amount authorized to Minor Construction at the end of the month was \$14,972,657 of which \$7,850,512 has been expended or committed leaving an unexpended amount of \$7,122,145. The small tool inventory was completed and provides a more comprehensive listing of all items.

Bids for the second remote crane and for the slave crane viewing periscope, Project CA-513-E - Purex Facility, have been received and are being reviewed.

ADVANCE ENGINEERING SECTION

The plutonium fuel cycle demonstration reactor concepts proposed in preliminary report HW-44703 were reviewed with a delegation from Washington AEC. Comments were favorable to the D₂O moderated case.


MANAGER, ENGINEERING

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ENGINEERING ADMINISTRATION SECTIONAUGUST 1956TECHNICAL INFORMATION UNIT

A bibliography, "Organic Liquids, Their Properties and Use as Reactor Coolants and Moderators," HW-44742, was issued during the month.

A proposed Fuel Element Classification Guide has been submitted to the AEC Office of Classification in Washington for final review and approval.

A shipment of fifteen boxes of classified documents was received from the Yellow File in Schenectady, making a total of 98 boxes to date. This shipment closes out the Yellow File. After being checked in, the documents are being retired to the Records Center.

Considerable time was spent on disposing of Kadlec Hospital's Medical Library, since it will become the property of Kadlec Methodist Hospital on September 10, 1956. It is planned to give most of the Library collection to the hospital, and retain a small part for a General Electric Industrial Medical Library.

The "Program Study Report on the Plutonium Fuel Cycle," HW-44703, was rushed through Technical Publications in time to meet a critical deadline. The rough draft was received on Friday morning, and on the following Monday ten finished copies of the 80-page report were delivered to the AEC. Seventy-five internal copies were issued on Tuesday, and the offsite copies are being held pending further instructions from the AEC. The report was used as a basis for an appropriations request for the "Little Demon" reactor.

The General Manager has asked Technical Information to set up a management reading service designed to give the Managers of the six major components continuous reports on the business and technical developments in the atomic energy field which might affect the competitive position of Hanford. At month's end, a position description was being written and a search for job candidates was under way.

The Technical Information Unit, which probably has the largest staff of Q-cleared clerks on the Plant, was under great pressure during the month to supply clerical employees to new components of the reorganization. All the Motor Messengers in the Unit have transferred to better jobs, and five clerks are going to higher-rated jobs in other components. These transfers are presenting an acute training problem, since a series of upgrades to fill each vacancy must be made within the Unit, and a great many employees will be on new jobs.

STATISTICS UNIT

The Statistics Unit is a service organization and this is a report of the work performed. The results of this work are available from the reports prepared by the requesting organizations.

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Visitors

F. J. Wall of Dow Chemical Company, Rocky Flats, Colorado, visited with Unit personnel on August 27 and 28, and R. K. Ziegler of Los Alamos Scientific Laboratory, Los Alamos, New Mexico, visited with Unit personnel on August 27. The purpose of these visits was concerned with statistical aspects of final product specification problems.

FOR THE ENGINEERING DEPARTMENT

Statistical endeavor concerned with pile technology involved the following analyses: Rupture data analyzed during the month consisted of data from a run-to-rupture test involving cored slugs with aluminum end plugs, and data correlating side failure rates with slug reject rates, particularly closure radiographic reject rates. Warp and diameter change analyses were performed on preliminary data from two production tests, one involving different vertical quench heat treatments, and the other concerned with dingot slugs, primarily extruded dingot slugs. A problem in probability concerned with the simultaneous failure of independently operating instruments was solved. Accuracy and precision calculations were made for the B-Basin Dimensioner.

Statistical endeavor concerned with fuel technology involved the following analyses: Assistance was given in designing an experiment to evaluate two more variables as they affect the yield in the canning of I and E slugs. Further calculations involving penetration data from bonded discs were performed, in addition to considering means of best estimating the parameters of interest in the bonding process. A correlation analysis was performed on data relating hydrogen content of slugs with auto-radiographic data. Further work has been done in determining the relationship between the quantity of hydrogen in uranium slugs and amount of void areas in the final canned product.

Statistical endeavor concerned with separations technology involved the following analyses: The statistical calculations for a quarterly report covering Z-Plant production for the second quarter of calendar year 1956 were completed. Further work was done on the historical study of 70-58 versus density relationship for various periods of Z-Plant production in an effort to determine which process changes may have had a significant effect on the utilization for its intended purpose. A meeting was held with visitors from Los Alamos and Rocky Flats to discuss the use of the "by difference" measurement method for plutonium in our final product. The statistical aspects of the final product specifications were discussed in general as well as several specific statistical problems. Assistance was given in the solution of sets of simultaneous linear equations arising from a problem concerned with the distribution of fission products through an irradiated slug.

FOR THE MANUFACTURING DEPARTMENT

Statistical endeavor concerned with separation processes involved the following analyses: Work was done to establish an SS Accountability factor for the plutonium content of buttons which are being received from SRO. Measurement precision estimates were also calculated for the two laboratories concerned. Work was done to derive the best method of calculating the weighted average 70-58 content for Z-Plant final product parts assuming two reasonable distributions of 70-58 concentration throughout the parts.

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Statistical endeavor concerned with reactor processes involved the following analyses: A graph was prepared indicating the gain in information about the average calibration factor for Venturis as a function of the number of Venturis calibrated. Assistance was provided in analyzing data obtained from an initial shipment of thermocouple replacement wire intended for "B" reactor. The main purpose of this study was to determine to what extent this initial shipment was meeting specifications and what might be expected of future shipments.

Work concerned with metal preparation processes mainly concerned a comprehensive review of the application of statistical acceptance plans to incoming caps and cans.

FOR THE RADIOLOGICAL SCIENCES DEPARTMENT

Assistance is being provided in the design of an experiment to determine the practicality of issuing the same Victoreen pencils to employees for a week period before reading and recharging versus the present system of daily reading and recharging. Assistance was provided in evaluating bioassay plutonium analysis data to determine whether or not it exhibits non-randomness characteristics. In this regard, a statistical technique was developed and its use suggested to test for non-randomness. In connection with the project of investigating the cross-sectional down-wind distribution of smoke plumes emitted from a point source, suitable models have been developed to handle the vertical distribution sampling and estimation problems involved in this project. Work is continuing on the horizontal distribution and estimation problems. Analyses are being performed to investigate the effect of effluent water and/or other contaminating agents on the life cycle of various Columbia River marine life. Assistance was provided in attempting to explain why samples of effluent water consistently indicate more activity than can be accounted for by analysis of the known isotopic components.

FOR THE EMPLOYEE AND PUBLIC RELATIONS DEPARTMENT

A survey of the residents of the City of Richland utilizing sampling techniques was completed during the month. The purpose of this survey was to obtain within specified precision the age distribution of the residents. A questionnaire form used for personnel development programs was developed for the purpose of obtaining attitudes and opinions of new technical and business graduates. Analysis of results of the recently conducted attitude survey on the Health Bulletin publications was completed. The main purpose of this survey was to ascertain readability and effectiveness of the Health Bulletins with the objective of improving communications in this field.

FOR THE FINANCIAL DEPARTMENT

A letter presenting comments relative to the value of the new method of reporting absenteeism of non-exempt employees based on frequency of absences was prepared and issued to personnel responsible for the new report.

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FOR THE OPERATIONS RESEARCH AND SYNTHESIS SECTION

Statistical evaluation of past slug rupture data (mentioned in the July Monthly Report) is continuing. Currently, H-Pile tube charge data for the period March 1954 to April 1956 is being used for a pilot analysis. Once a general analysis scheme has been devised, all charge data will be processed on the IBM 702 machine. Two rupture outbreaks occurred at H-Pile during the above period. The first, reported in HW-33645, "Slug Rupture Outbreak at H-Pile," occurred during October 1954. The seventeen ruptures involved were evidently caused by a local hot spot of short duration during a rapid startup. The second outbreak, constituting about 70% of all ruptures in the period under discussion, has not as yet been thoroughly investigated. The ruptures all stem from four successive charge dates in the fall of 1955. These four charges were exposed to much higher tube power than any of those immediately preceding them. Whether or not this latest outbreak is the beginning of a new trend in rupture rates or merely a short-lived affair cannot be ascertained until more recent data has been processed. Exposure at discharge is another variable being investigated. H-Pile ruptures are being classified according to exposure and tube power with the hope that a more significant cause and effect relationship can be established using the second variable rather than just tube power alone.



Manager - Engineering Administration
ENGINEERING DEPARTMENT

WM Harty:rd

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PILE TECHNOLOGY SECTION

August 1956

VISITORS

P. E. Armstrong, Ames Laboratory, Ames, Iowa, visited HAPO on August 29 to discuss problems related to HAPO slug program.

J. J. Gill and A. F. Markel, North American Aviation, Canoga Park, Calif. visited HAPO, August 7-9, to witness and coordinate in-pile cross section analyses of metal sodium in relation to contract AT 04-3-49.

N. D. Groves, Carpenter Steel, Reading, Pa., visited HAPO on August 29 to discuss background data on corrosimeter and parts.

N. E. Huston and N. C. Miller, North American Aviation, Canoga Park, Calif. consulted at HAPO on reactor safety program relating to contract, August 28-29.

A. Lagani and R. E. Larson, KAPL-Schenectady, spent August 20-22 at HAPO for review of KAPL QWP program and operation.

W. H. Moran, UCRL-Livermore, Calif., visited HAPO to consult on Whitney work, August 28-29.

A. S. Nowick, Yale University, New Haven, Conn., spent August 13-17 at HAPO for consultation on internal friction of uranium problems.

L. G. Powers, GE-Schenectady, and F. P. Robinson, Jr., GE-Pasco, checked leak detector at HAPO on August 20.

Donald Rogers and James Stivala, North American Philips Company, New York, N. Y., visited HAPO on August 1 to service electron microscope.

TRIPS

K. J. Bell and F. W. Van Wormer discussed I&E Slug Program at duPont-Savannah River Plant, Augusta, Ga., August 13-14.

T. K. Bierlein and T. C. Nelson attended high speed photography school sponsored by Fastex Company in Seattle, Wash., August 13-14.

J. F. Hokenson and G. J. Rogers attended seminar on use of high speed motion picture photography at California Ink Company, Seattle, Wash., August 13-14.

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S. H. Bush presented a paper at Radiation Damage Effects Review Meeting held in Chicago, August 1; discussed similar phases of ANL-HAPO metallurgy programs on August 2 at Argonne National Lab., Lemont, Ill; discussed new alloys of uranium on August 3 at GE-ANP, Cincinnati, Ohio.

J. J. Cadwell attended meetings at Association Island, August 2-4.

G. C. Cochrane consulted on design and operation of vacuum melting equipment and on design equipment and fabrication problems at Consolidated Vacuum Corp., Rochester, N.Y., Stokes Co., Philadelphia, Pa., and National Research, Boston, Mass., August 27-31.

W. V. Cummings attended the 5th Annual Symposium, Denver Research Institute, Denver, Colorado, August 9-10.

R. V. Dulin and P. P. Eddy observed and studied organic in-pile loop installed by NAA at Phillips Petroleum, Idaho Falls, August 16-17.

R. E. Field examined metallographic facilities at Battelle Memorial Institute, Columbus, Ohio, on August 7 and at Bausch & Lomb, Rochester, N.Y. on August 8.

D. E. Johnson and J. W. Riches consulted on the fabrication of zirconium process tubes at Allegheny-Ludlum Steel, Watervliet, N.Y., Bridgeport Brass, Bridgeport, Conn., Superior Tube, Norristown, Pa. and Babcock & Wilcox, Beaver Falls, Pa., August 20-24.

D. C. Kaulitz discussed in-pile temperature measurements on August 1 at KAPL-Schenectady. Mr. Kaulitz spent August 29-31 at Engelberg Huller Company, Los Angeles, Calif. to examine belt centerless grinder for UO_2 fuel elements and design gas type hood for grinders.

C. R. Lagergren discussed problem of mass spectrometer facility, August 2-3, at Phillips Petroleum (NRTS), Arco, Idaho.

M. Lewis presented a paper at Radiations Effects Review, AEC-Chicago, August 1-2.

J. W. Lingafelter visited Chase Brass, Waterbury, Conn. and Superior Tube, Norristown, Pa., regarding zirconium process tubes, August 29-31.

R. W. Moulton consulted on fluid flow problem at the University of Minnesota, Minneapolis, August 15. Mr. Moulton spent August 16-17 at Argonne National Lab., Chicago, consulting on engineering education problems.

H. A. Paulsen visited GE plants at Cincinnati, Syracuse, Utica, Philadelphia and Schenectady, July 30 through August 10, for salary administration discussions.

F. B. Quinlan inspected vacuum melting equipment at Consolidated Vacuum Corp., Rochester, N.Y., Stokes Company, Philadelphia, Pa., and National Research Corp., Newton Highlands, Mass., August 27-31.

J. T. Stringer visited Oak Ridge Operations Office, Oak Ridge, Tenn., and Aircraft Nuclear Propulsion Center, Cincinnati, Ohio, regarding fuel element fabrication technology, August 28-29.

K. G. Toyoda consulted on problems of handling organic coolants, August 10, at Thermal Engineering & Equipment Company, Los Angeles, Calif.

W. P. Wallace visited Metals & Control and Research Lab. at Schenectady, N.Y., Allegheny-Ludlum and Sutton Engineering at Pittsburgh, Pa., regarding fuel element fabrication, August 1-3.

D. E. Wood observed neutron spectrometer performance, ZPR-3, at Idaho Div. of ANL, Idaho Falls, August 9-10.

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ORGANIZATION & PERSONNEL

July 31

August 31

Administrative	2	2
File Engineering	114	114
File Materials	75	75
Fuel Technology	122	122
Physics Research	50	45
Metallurgy Research	93	91
Contact Engineering	4	4
Technical Administration	10	10
Totals	470	463

File Engineering: W. J. Van Den Berg, Jr. and A. E. Tucker, Engineer I's, were hired August 3 and 6, respectively; C. C. Wheeler, Engineer II, and D. O. Allred, Technician Trainee, transferred in from Education & Training, August 1 and 20, respectively; B. M. Riddle, Secretary B, transferred in from Design Section, August 13; K. J. Bell and D. E. Amos, Engineer I's, terminated August 24 and 31, respectively; S. A. Dige and M. S. Pike, Secretary B's, terminated August 17 and 24, respectively; L. L. House, Junior Engineer, transferred to KAPL on August 8.

File Materials: R. L. Rider, Technician Trainee, transferred in from Education & Training on August 20; H. O. Miller, Technician Trainee, terminated August 31.

Fuel Technology: M. S. Bogdanovich, Secretary B, transferred in from Technical Personnel, August 13; B. F. Messer, Secretary C, transferred in from Purchasing, August 13; K. J. Wright, Technician Trainee, transferred in from Employee & Public Relations, August 3; S. B. Crisp, Secretary C, and C. A. Kremer, Secretary B, were deactivated August 3 and 16, respectively; E. H. O'Claire, Engineer II, transferred to Radiological Sciences, August 13; H. C. Bowen and C. E. Fitch, Engineer II's, transferred from weekly to monthly, August 1.

Physics Research: R. K. Henrich and J. M. Stakkestad, School Teachers, terminated August 17; C. T. Gibson, College Junior, terminated August 24; J. J. Regimbal, Graduate Student, terminated August 31; R. J. True, School Teacher, terminated August 29. These men were summer employees.

Metallurgy Research: J. C. Tobin and M. K. Millhollen, Engineer I's, were hired August 10 and 16, respectively; A. P. Woodall, Engineering Assistant, terminated August 6; M. J. Sinnott, Senior Scientist, terminated August 24; G. R. Mallett, Engineer II, terminated August 28; L. F. Kendall, Engineer I, terminated August 31.

PILE ENGINEERING SUB-SECTIONPROCESS TECHNOLOGYPower Level Limitations

Maximum power levels at the B Reactor have been limited by trip-before-instability limits near 105 C. The C Reactor has been limited by the 98 C tube outlet limit and the DR and F Reactors by the 100 C tube outlet limit. The D and H Reactors have been limited by the 105 C tube outlet limit and the K Reactors by tube power limits.

Process Specification Changes

Specification 32.00 - Pressure and Flow Rate of Reactor Gas - The specification was revised to permit a pressure below atmospheric in the piping between the reactor outlet and the blowers, provided safeguards are maintained to prevent oxygen from entering the piping. Also, the use of the plenum flow control valves at the K Reactors for transient control of the graphite temperature was permitted.

File Operation

The following numbers of tubes were removed and replaced under the routine tube replacement program: B-61, F-100, and H-195. In addition, four tubes at B, and two tubes at H were removed for examination by the Pile Coolant Studies Unit. These tubes were all replaced plus four tubes at B and five tubes at H which were left from previous outages. One tube at C was removed and replaced because of a stuck charge. There was one tube leak at KE and two rear Van Stone leaks at F during the month compared to 17 tube leaks, and four rear Van Stone leaks for all reactors last month. The leaking tube at KE was replaced and the tubes with rear Van Stone leaks at F were blanked off and left as air tubes.

Ruptured Slugs

The two ruptures which occurred at C Area were intermediate exposure ruptures. This continues the rate established last month as a result of raising the fringe goal exposure. Approximately 200 tubes charged July 15 on intermediate goal will be approaching goal about October 1, and it will then be possible to estimate the power cut required as a result of raising the goal exposure.

Lots Z-25, K-289, K-110, M-90 and other lots showing two ruptures were examined for charging machine damage to the ruptures and possible selective discharge. No formal recommendation for a special discharge was made, however, a third rupture in any of these lots would call for special discharge of the remainder of the lot.

A recommendation was made to Production Scheduling that M lot material be charged in tubes with low rupture proneness while more precise temperature - power relations are developed to secure optimum selective charging.

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Ruptured Slug Tabulation

<u>Failure Date</u>	<u>Tube No.</u>	<u>Lot No.</u>	<u>Type Metal</u>	<u>Exposure</u>	<u>Type Failure</u>
7/27/56	2677-H	K-289	8" Regular	334	Side - Other
7/29/56	3457-D	N-40	8" Regular	813	Side - HS
8/4/56	0370-DR	Z-36	8" Regular - Reprocessed	839	Side - HS
8/4/56	2784-KE	K-259	8" Regular	728	Split - Longitudinal
8/6/56	0568-C	M-155	8" Regular	418	Unclassified
8/11/56	3556-D	K-110	8" Regular	767	Side - HS
8/18/56	2855-DR	Z-25	8" Regular - Reprocessed	877	Side - HS
8/20/56	4783-KE	K-247	8" Regular	730	N.A.
8/22/56	0683-C	N.A.	8" Regular	437	Side - H.S.

Legend:

N.A.	- Information not available.
Side - HS	- Failure caused by a hot spot.
Side - RR	- Failure caused by reduced rib height in the tube.
Side - Other	- Failure probably caused by some mechanism other than RR or HS such as pin hole penetration or other unknown mechanism.
Cap	- Failure caused by loss of cap.
Split - Longitudinal	- Lengthwise or diagonal split.
Split - Transverse	- Split normal to axis of slug.
Unclassified	- Failure type does not fit into any of the above categories.

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PRODUCTION TESTS

<u>Test No.</u>	<u>Type Metal</u>	<u>No. of Tubes</u>	<u>Pile</u>	<u>Goal Exposure</u>	<u>Present Exposure</u>	<u>Remarks</u>
105-586-A	U-81 Ingots	1	B	900	Dis. at 1007 MWD/T	Not yet charged
	U-81 Ingots	4		2 ruptures		Not yet charged
	U-81 Cored	3		900		Not yet charged
	Control	4		2 ruptures		Not yet charged
105-590-A	Extruded Cored	4	C	ruptures	Not yet charged	Compares performance of extruded and drilled cored slugs.
105-591-A	Cored		ALL but C	800		Authorizes irradiation of production quantities of cored slugs.
105-597-A	Mg.-U Matrix	1	B or D	3000	Not yet loaded	2 Matrix slugs + 31 reg. slugs.
	4 slugs	1	B or D	6000	Not yet loaded	10 Enriched matrix and 12 normal matrix slugs.
105-608-A-56-MT	Dingot Slugs	16	B	7-600 9-900	885-990	Seven tubes discharged at 600 goal. Compares various mechanical and heat treatments of dingot uranium.
105-608-A-56-MT Supplement A	Dingot Slugs	23	D	High Variable Goal	135-900	Three charges from each month's dingot uranium shipments are to be irradiated to high variable goal exposures.
105-608-A-56-MT Supplement B	Dingot Slugs	4	C	Ruptures	Not yet loaded	Compares performance of dingot and ingot uranium slugs.
	Controls	4	C	Ruptures		
105-610-A-60-MT	Vertically Heat Treated Uranium	10	DR	5-600 5-900	750-765	Rod heat treated in vertical position. Five tubes discharged at 574-594 MWD/T.

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105-611-A	Reg. Produc.	33	19 B	500,900, 1100	800-950	Eight discharged at 500 Goal. Investigates the effects of pile variables upon slug stability. Five discharged at 500 goal. Two discharged at 800 goal.
105-613-A- 54-MT	Solid	19	KW	3-400 8-600 8-900	250-280	Delays 35, 50 and 80 seconds between salt bath transforma- tion and water quench. Heat treated in rod form.
105-615-A- 63-MT	Lead Dip Canned I & E	8	C	150,300,500 and 2 ruptures	about 700	Provides basic information on I & E performance and conversion ratio. Four tubes of each type loaded 3/14/56. One I & E charge discharged and replaced at about 50 MWD/T. Four additional charges of each type loaded 5/17/56. All goal exposure charges discharged.
105-620-A- 65-MT	Tru-Line		C	Normal goal	Not yet started	Provides for the quantity charg- ing of Tru-Line slugs.
105-621-A- 67-MT	Anodized	12	10-D	600,800,MWD/T	460-480	To determine corrosion resist- ance and provides for the eventual charging of anodized slugs in quantity.
DT-105-623-A	Regular		DR	Normal Goal		Provides for the hand seating of charges loaded on alternate outages. Investigates effect upon failure rates.
DT 105-636-A- 58-MT	C Metal	20	C	Normal Burnout	Not yet loaded	Ten charges each of double- length and Tru-lined "C" slugs will be irradiated to normal burnout and inspected to deter- mine the degree of protection from "chattering".

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MECHANICAL EQUIPMENT DEVELOPMENT

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Reactor Safety

BF₃ Reactor Safety System - Five tests evaluating the effect of BF₃ on graphite at elevated temperatures were completed in the 305 Pile. In general results agree with those obtained from previous tests. It can be concluded that the in-hour value per bar of graphite increases with an increase in BF₃ exposure temperature, and that after four or five hours exposure to BF₃, little change in reactivity occurs with continued exposure if the temperature is held constant. From the results of 13 tests, it appears that BF₃ gas will add enough poison to graphite to make it a suitable "last ditch" safety system for graphite reactors.

Disaster Studies - Production Test No. 105-542-SI authorizing irradiation of uranium samples has been approved and the samples have been prepared. Arrangements for the laboratory apparatus for experiments on release of fission products from the irradiated uranium samples have been completed.

New Process Methods and Prototype Equipment

Sliding Rear Gunbarrel Attachment - Laboratory tests of a sliding gunbarrel flange for the rear face have been completed and preparations are being made for a Development Test, probably on F Pile. A report on work to date is being prepared.

Test Tower Mock-up - Work is continuing on a short mock-up of a vertical rod test tower in the 186-D Building. Equipment is being moved from the old test tower at White Bluffs.

Flanging Zircaloy-2 Process Tubes - A hand operated roller was developed which appears to have enough strength to roll a flare on the full wall ribless KER tube. The tube tested in the first attempt cracked radially at about a 20° flare, but further attempts may correct this.

Rubber Boots for Gunbarrel Bellows Repair - Testing of a split boot to fit over the bellow gas seal is continuing. Mock-up tests have shown that leaks around the O-ring of the gas seal flange can be sealed with a GE No. 81508 silicone non-melting grease against as much as 60 inches of water pressure.

Graphite Miner - Recent tests have shown that the Graphite Miner can make cuts through graphite mock-ups of the worst distorted channels found in any pile. The final machined surface can be held within close tolerances.

Poison Spline - Fabrication of equipment for a Production Test using 50 spline seal nozzle caps on the front face is continuing.

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Pump Drive Thrust Forces, CG-558 - Tests to measure the axial forces causing movement of the motor shaft have been completed. The force required to shift the rotor or motor No. 5 in 190-DR Annex was measured during the 24 hour acceptance run. These forces were less than the thrust ratings of the bearings.

VSR Position Indicator - A VSR piston position indicator was made by having the piston attract a magnet and the movement of the magnet operate a micro-switch to indicate whether or not the piston was in the up position. A further improvement has been made using a mercoid switch in place of the micro-switch. This makes a dependable indicator if the VSR cylinder is non-magnetic as in the case at K Pile.

Design Tests

Test No. 1706-KER-4, High Pressure-High Temperature Loop - Testing of both the stainless steel and carbon steel on inch KER headers was completed. Both operated with no leakage after the first two or three of fifty heat cycle runs. The next test scheduled is Design Test Request No. 1706-KER-2, which will test external piping flanges.

Flush Discharge Chute - Flushing velocities of 15 and 20 feet per second have been attained, duplicating velocities in flush discharges during operation at C Pile. Preliminary tests indicate satisfactory control of slugs and water can be accomplished by the present design, with minor alterations.

Design Test No. 58, Barco Swivel Joint Connectors - While testing the J Pile prototype Barco connectors with metal to metal seals, slight leaks were found. Inspection of one joint indicated improper lapping of the seal to be responsible. The other connector tested gave no indication of why it leaked. Further tests are being conducted.

Design Test No. 60, Piston Type Mono Charger - Materials necessary for the column charging test are on order and fabrication of equipment is under way.

Design Test No. 60, Air Accelerated VSR - The test will be delayed until an eight inch tube ordered by the Design Section is received. An interim report covering holding forces and release time was issued.

Design Test No. 61, Vee Band Nozzle - The test has been completed and a report is being issued. Misinterpretation of fatigue test data, previously reported, indicated that the 37° flare was inferior to the Van Stone joint, but a re-evaluation indicates that it is at least comparable.

Design Test No. 62, Air Filter Test - Equipment design is complete and estimates for fabrication are being obtained. Purchased items except for pre-filter units and louver dampers have been received.

Design Test No. 66, VSR Improvement for Existing Reactors - Prints and work orders for construction of a six inch magnetic latch have been delivered to the 200-W Shops.

Fuel Elements and Slug Handling

Ribbed Slugs - Six complete charges were made in a new ribless tube using slugs with 1/4 inch diameter projections instead of rails. Only superficial damage to

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the tube resulted. Additional slugs with 63-S aluminum rails are being fabricated.

Slug Cocking and Column Bowing - Slug cocking and column bowing tests continued during the month. Several cases of column bowing were observed in a distorted B-D-F tube under CG-558 flow mock-up conditions.

Automatic Slug Sorting in Basin - Scope designs have been completed for an automatic slug sorting system for installation in the basin of C Pile.

Slug Can Thickness Measuring Device - Preliminary tests to prove the feasibility of accurately measuring the can wall thickness of slugs by measuring the change in force required to penetrate through the aluminum into the uranium as a function of distance penetrated have been completed.

PILE PHYSICS

K Reactor Temperature Cycling Control - PT 105-630-A

Use of the experimental control rod configuration utilizing upstream and downstream rods to avoid front-to-rear graphite temperature cycling was continued during the month at the KW reactor, the majority of the time without Pile Technology shift coverage. Operating experience has demonstrated that the control problem with this configuration is essentially reduced in complexity from three dimensions to two. Flattening changes are now being directed toward maximum power output with this more stable control configuration.

Concurrent theoretical flux distribution calculations indicate that the KW front-to-rear flux distribution is now peaked to approximately the same extent as an unflattened cosine; in practice this results in a nearly ideal front-to-rear graphite temperature distribution with the present coring pattern.

HCR Calibrations - PT 105-605-A

The analysis of startup reactivity predictions for the B, D, DR and F reactors using the recent DR rod calibrations has been summarized in rough draft form preparatory to review and publication. Conclusions from the study have been that, with proper coefficient re-evaluations, predictions can be made as accurately with the new calibrations as with the old; actually on an absolute basis the prediction error should be less with the new stronger rod calibrations.

Rough drafts have also been completed of a comparison between the recent DR calibrations and original startup data and of an interim report on the DR calibrations to date. Work is progressing on reconciling rod withdrawal rate specifications to the revised calibrations.

Nuclear Safety Studies

Work was continued during the month on the preparation of the Post CG-558, 600 (water plant expansion program) hazards report. A preliminary study for devising reactor operations disaster procedures is being initiated in conjunction with the document preparation.

Audit observations of LTR and TTR research reactor operations during the month indicated their operation to be consistent with good safety practices.

A study has been completed in rough draft form to establish bases for enrichment and control operability limits in the Hanford piles. This study is based largely on the calculational methods used to describe the results of the KE startup measurements of enrichment limits. In these calculations the graphite temperature coefficient effect is an independent variable whose effect may be adjusted as better coefficient data become available.

A final report on the production test for evaluating safety system control by scram transient analysis was submitted for publication as formal report HW-43893. Because of inherent errors introduced by the finite geometry of the control system and by the particular location of the detecting instrument, it is concluded that this method cannot be depended upon for absolute calibrations of the Hanford safety control systems.

Reactivity Coefficient Studies

A study to develop improved methods for measuring the metal power coefficient of reactivity in the Hanford reactors has been initiated.

Detailed weighting calculations on the KE graphite coefficient test series have proceeded during the month. A BNL document arrived on site giving their analysis of the November, 1955, dry graphite coefficient test. Aside from what we feel must be a quirk in the data at about 220 C which they infer to indicate an abrupt change in coefficient sign, their analysis is in good agreement with Hanford's.

Work also progressed during the month on a revised section on the calculation of xenon transients for the area physics manual of standard practices.

Fringe Poison for Shield Protection - PT 105-604-A

The supplemental test loading in which mint material was centered with natural uranium pieces was loaded in the H Pile fringe poison pattern during the month. Preliminary results indicate that there is probably little difference in the relation between pile production and shield temperature reduction between this method and that initially tried using discrete poison columns and metal columns.

Shield Neutron Spectroscopy Studies

Conditions simulating dosimeter use in a shielded cave have been simulated in an out-of-pile test. Counts were taken as the source and the dosimeter, the latter suspended two feet below the former, were lowered into a cave. The counting rate observed with the dosimeter shielded by the cave were only 24 per cent greater than with it suspended in mid-air, a small effect relative to the "order of magnitude" present state of dosimetry knowledge.

A trip was made to the ANL test site at Arco during the month to observe the proton recoil spectrometer in operation. Many of the operating details were cleared up, and complete diagrams of the electronics were obtained.

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PHYSICS DEVELOPMENT

Slug Rupture Detection

The scintillating crystal gamma ray spectrometers (gamma monitors) installed at the five older piles are giving satisfactory functional performance. The gamma monitor installation at C Pile is now essentially complete and will be operating at the next C Pile startup. The detailed circuit designs for the F Pile gamma monitors are being firmed to provide Jordan, i.e., the vendor, with final component values in a system designed to further reduce failure rates and improve performance.

The prototype rupture containing process tube location system installed at C Pile continues to give encouraging results. Development work on the halogen filled geiger-muller type tube detectors is continuing in an attempt to obtain improved response characteristic matching.

A prototype of the dual slug rupture detection system to be used in the KW and KE pile through test hole monitoring application is being performance tested at H Pile.

Reactor Instrumentation - Nuclear Safety

Minor modifications have been made in the positioning of the sub-critical pile neutron multiplication detector which permits its reliable use during all phases of reactor shutdown and operation; that is, the single system of instrumentation provides both period and level trip protection at full operating level as well as in the full shutdown condition or any intermediate condition. Two startups were observed at D Pile on the prototype sub-critical monitor being tested at that location with completely satisfactory results. Some circuit modifications are being made to further simplify maintenance and improve the reliability although the system is now superior to any provided commercially.

Faults in the instrument power supply at the K Piles have led to an unusual number of accidental reactor scrams. A method of utilizing coincidental trips to eliminate scrams resulting from the failure of individual instruments has been developed which provides safety protection equivalent to that provided by individual systems.

The high temperature process tube ion chamber for use in the octant monitoring application at B, D, and F Piles has been installed in F Pile and testing is now underway.

Lattice Neutron Economy

The two columns of internally-externally cooled slugs which were irradiated at C Pile to serve as the basis for a chemically determined conversion ratio have had their exposures determined to one per cent accuracy as follows:

0777 C	I & E	587.7 MWD/T
0876 C	I & E	565.9 MWD/T
0776 C	Solid Standard	536.6 MWD/T
0877 C	Solid Standard	523.2 MWD/T

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The tube exposures are being allocated among the individual slugs and chemical dissolution can be initiated in October to determine the plutonium content and U-235 depletion.

Experiments to determine the lattice constants of graphite lattice fueled with 1.68 inch O.D. solid natural uranium slugs have begun as the first phase of a program which includes cored and internally-externally cooled fuel elements based on experiments on slugs with a 1.68 inch O.D. in the 7.5 inch lattice (graphite density of 1.63) and 120 mil water annulus the following constants have been derived:

$$\begin{aligned}\Sigma &= \text{fast effect} = 1.041 \\ f &= \text{thermal utilization} = 0.906\end{aligned}$$

The data giving P, the resonance escape probability, are currently undergoing analysis. A similar experiment using organic cooling has also been performed and the results are being analyzed.

All components for cluster lattice experiments are now available. The techniques for the measurement of Σ in this case are completely developed but an improved method of determining P needs to be demonstrated.

A generalized semi-empirical formula for use in computing resonance escape probability has been derived. Equipment for use in the determination of high temperature doppler coefficients is still being accumulated.

Test Pile

The Test Pile has been adapted to provide quality control measurements on the sodium for the Atomics International sodium cooled reactor. The sodium, as provided by duPont, yielded an atomwise cross section of 0.485 barns as compared with 0.505 for the standards of chemical purity. This work will continue as a service for Atomics International.

HEAT TRANSFER

Full Scale Mockup

Apparatus modifications were completed and experiments to determine the flow instability characteristics of internally-externally cooled slugs were initiated.

Organic Coolants

Discussions were held with representatives of the Thermal Engineering and Equipment Company of Los Angeles, designers and installers of Dowtherm heating units, to obtain engineering data concerning pipe fittings, pumps, and valves suitable for use with diphenyl. The techniques discussed will be applied to the construction of the laboratory organic loop facility to insure a leak-tight system. Experiments were performed by L. L. Burger, Separations Technology, wherein samples of gasket materials, pump packing, and electric insulators were refluxed in MIPB at 290 C to establish compatibility with organic coolants. As expected, gaskets of rubber or impregnated asbestos broke down, but teflon and ordinary asbestos proved satisfactory. Of major interest is the effect of MIPB on Heresite phenolic resin. This

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resin is used to insulate heater rods from process tube ribs. On exposure to hot MIPB the resin discolored but, surprisingly, the electrical insulating characteristics were apparently improved.

High Pressure Boiling Studies

Burnout determinations were resumed following a shutdown for apparatus modifications and flow meter calibrations. The performance of the Potter flow meter was disappointing and recourse was made to calibration by tedious heat balance methods. Efforts to provide improved flow metering devices are now underway.

Slow flow calibrations hindered the work so that only thirteen burnout points were achieved, covering a pressure range from 600 to 2000 psi and uniform tube powers between 600 and 850 kw. In these experiments it proved difficult to identify "burnout". Near the "burnout" point heat transfer coefficients worsen, but this is not sharply dependent on steam quality or tube flow. In one test, for example, flow was throttled until indicated heater rod temperatures reached as much as 625 C without showing a sharp reduction in apparent heat transfer coefficient. The flow rate corresponding to a heater tube temperature of 625 C was substantially less than that corresponding to a heater rod temperature of 500 C, which is for convenience considered the burnout point. Temperatures near 625 C would lead to destruction of an aluminum heater rod (or slug jacket), and this indicates a possible reason for difficulty in correlating the burn-out data from different experimenters using heater rods of various materials. This also indicates that the use of high melting point slug jackets (zirconium) may lead to greater latitude in process design of boiling reactors.

Two-Phase Critical Flow Studies

A report presenting the results of a literature survey and a program of experimental work to improve ability to calculate flow rates of flashing fluids has been completed.

Hazards Analysis

More elegant calculations were made to predict the time required for water boil-out from a B, D, F process tube following sudden front pigtail failure. It was calculated that for a typical B-D-F tube in the central zone all of the water would be expelled within two seconds after the rupture. Experimental results obtained from the heat transfer mock-up showed that two seconds after the rupture, steam was issuing from each end of the process tube but there was still about 80 per cent water remaining in the forward two feet of the process tube.

A draft report was completed concerning flow backup facilities following Projects CG-558 and 600. The study indicates that from a flow backup standpoint the reactors are, on net balance, no more hazardous after these projects than before. Certain deficiencies in present apparatus have been eliminated by these projects, but tending to partially offset these gains is the use of a mode of emergency pump operation which places more stringent requirements on steam plant response. It therefore seems obligatory to require periodic verification of steam plant response to assure that the reliability of flow back-up system is maintained at the desired high level.

General Analysis

Calculations were made to enable determination of temperatures within slugs cooled by internal cooling channels. Formulas were derived to enable estimation of slug skin temperature with varying local heat transfer coefficients (or water temperatures) around the periphery. Formulas were also derived to enable estimations of flow rates, local heat transfer coefficients, and local water temperatures in eccentric slugs displaced toward the walls of the process tube.

SPECIAL IRRADIATIONSKAPL-120 Loop

During the two week outage (7/27 to 8/9), the following items were accomplished:

1. The hydroclone and crud cells were equipped with thermocouples and lagged.
2. The cubicle door was shielded with 1" of lead.
3. A replacement thermocouple well was installed in the pile tube outlet (Thc-#2).
4. Casks for transporting crud samples to the 300 Area were completed and a shipping cask for the ex-pile corrosion samples was completed.
5. New pump power wattmeters were installed.
6. Several small leaks were repaired.

In-Pile Irradiations

A detailed design of the Army Gas Loop was officially begun. Exploratory calculations are being performed by the technical contact engineer. A preliminary heat

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transfer analysis of the in-pile supporting tube has revealed somewhat lower tube wall temperatures than were originally anticipated; thus, a higher operating pressure appears possible. An analysis of the emergency cooling system is proceeding.

A document (HW-44321) containing detailed information developed during the mass cobalt-60 production study has been prepared as a companion to the summary report (HW-44320). This completes HAP0 efforts on the study. Issuance of the document has been delayed pending a clarification of classification requirements.

An analysis of the flux data obtained in connection with KAPL-120 loop flux studies in H Pile has revealed an experimental value of 2.9 for the ratio of volume average thermal flux in lightly absorbing material in a process tube to that in uranium slugs in adjacent process tubes. This compares favorably with the theoretical ratio of 3.0 reported in HW-33868, Revised. The cadimium ratio in the lightly absorbing column was determined to be 14.2, or

$$\phi_0 = 0.059 \bar{\phi}_{2200} \text{ where}$$

$$\phi_0 = \text{resonance flux per lnE increment}$$

$$\bar{\phi}_{2200} = \text{thermal flux at 2200 m/sec.}$$

The in-pile portion of a facility for the recirculation of an organic coolant (MIPB) is ready for charging into the 2-A test hole at KE Pile. Charging is presently delayed by difficulties in the procurement of out-of-pile equipment, principally a pump. This work (HAP0-182) is being done in cooperation with the KER-Semi-Works Unit and the Recirculation Technology Unit.

A series of capsule irradiations of organic coolants (HAP0-183) will be carried out in the 2-A test hole at KW Pile. A draft of the production test has been routed for comment and the components for the first charge are being fabricated. The container temperatures will be monitored. By utilizing gamma heating, the first exposure will be carried out at 300 to 350 C. At a later date, controlled temperature (using electrical heaters) irradiations will be performed.

The measurement of the annular water stream temperatures for solid slugs continues at D Pile. This is being done by means of temperature probes similar to those used with the I & E experiments. The probes have been installed in four process tubes. Each probe contains four thermocouples; temperatures for a single probe have varied from 10 C below to 25 C above the bulk outlet temperature.

The irradiation of three 4", cored and insulated, natural uranium slugs (HAP0-174) is planned for the 3674 KW front to rear test hole. A production test rough draft is now circulating for comments. It is planned to install a prototype assembly (solid aluminum dummies substituted for slugs) during September. The fuel element irradiation is scheduled to begin during October.

Four I & E temperature probes (charged May 18, 1956 into 0973, 0980, 1074, and 1079-C) continue to operate. The probes in 1074 and 1079 show a gradual increase in the bore water stream temperature. It is planned to replace these two probes with new assemblies in the near future to determine whether the observed effect is real or instrumental in nature.

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Pile Engineering Sub-Section

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Facilities

During the routine discharge of the B Test Hole magazine in 105-F, two sample tubes were found to be leaking. All samples were discharged and plans are being made to remove the facility at an early date.

Additional work is necessary to place the gamma irradiation facility at KE Basin into operation for conducting the Wright Air Development Center program. The unloading of the slugs which are used to provide the gamma source has presented a problem. The difficulty appears to be caused by two factors, (1) warpage of the slug cavity during welding operation; (2) dimensional changes in the slugs which occurred during irradiation. Modifications to the slug buckets are presently in progress in an attempt to correct this situation.

A gamma flux traverse was obtained for a WADC sample tube. These data indicate a calculated average dose rate of 7×10^5 R/hr for the decay period from one day to 31 days. This value is 2.5 times greater than the dosage rate available in the F Area gamma pit. Two samples have been received from a WADC contractor and it is anticipated that capacity irradiations will begin shortly.

Authorization to proceed with the renovation of the 105-KW Special Irradiations Laboratory has been received from the AEC. The project is now awaiting the issuance of a Work Authority.

The receipt of critical material for the fabrication of the Hanford Cobalt Facility has begun. Delivery should be complete by December 1956. The original intent had been to locate the facility in the 105-KW viewing pit. Maintenance of the slug manipulator which is also located in the pit will, however, require the periodic draining of the viewing pit. A survey is, therefore, in progress to determine whether it would be better to operate on the basis of removing the source rods when pit drainage is necessary or to relocate the facility.

The development of reliable control instrumentation for the operation of the 2-B magazine facility at KW with heated cooling water is proceeding.

Vertical Bowing Measurements and Borescoping

Vertical bowing measurements were made on two pile tubes and two traverse holes during the month. The data are summarized below:

<u>Area</u>	<u>Tube No.</u>	<u>Date</u>	<u>Remarks</u>
100-DR	4674-Front	7/24/56	Down .04 at 8' since 4/25/56. Down .06 at 10' since 4/25/56. Down .05 at 20' since 4/25/56.
100-C	4674-Front	8/16/56	Up .02 at 8' since 5/29/56. No change at 10' since 5/29/56. Down .09 at 20' since 5/29/56.
100-KE	Y-2	8/13/56	No previous data.
100-KW	Y-2	8/17/56	No previous data.

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The K Pile traverses were taken with a mercury manometer which incorporated a push-ole to maintain vertical alignment of the manometer head.

Vertical Safety Rod channel #58, 105-C, was borescoped at the request of Reactor Operations on August 1, 1956. At 28 feet from the top of the unit, the blocks were separated about 3/4"; from 28' to 32' every other block was separated and about 15 balls were visible on each separation. The inspection was terminated at 32'. Vertical Safety Rod channel #41, 105-C, was borescoped at the request of Reactor Operations on 8/16/56 to a depth of 41 feet. This was a further check of the condition found in #58 channel on 8/1/56. At 12-1/2' from the top of the unit, downstream movement of approximately 3/4" of a tube layer filler block was noted. The block extended into the channel and showed evidence of being in contact with the rod. The filler block on the next tube layer below showed a movement of approximately 1/2" into the channel. No other serious obstructions were noted.

Process tube channels 1888-H and 1570-H, were borescoped on 8/2/56 at the request of Reactor Operations. Previous attempts to retube both channels had been unsuccessful. The inspection of channel 1888-H revealed a broken spacer block at 17-1/2' from the front with a significant amount of graphite and aluminum chips throughout the channel. A 5" separation between tube blocks was seen at 30'. In channel 1570-H, the first three tube blocks were split lengthwise. From that point on, the graphite appeared to be in relatively good condition except for evidence of severe galling. The blocks were gouged throughout their entire lengths with aluminum chips and flakes in the gouge marks.

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PILE MATERIALS SUB-SECTION

GRAPHITE AND MATERIALS DEVELOPMENT

High Temperature Graphite Irradiations, GEH-9

The test thimble which was irradiated for six weeks in the L-42 position of the MTR as GEH-9-2 was cut up in the MTR discharge canal prior to transferring the pieces to the hot cell. The four graphite samples will be removed from the thimble sections using the remote handling equipment of the hot cell. Properties measurements will be made at Hanford.

Irradiations GEH-9-3 and -4 are scheduled for six weeks each beginning September 24. The test thimble for the first irradiation is at the MTR and has been tested and approved for installation.

Cooled Test Hole Irradiations

During a scheduled graphite sample discharge from the B test hole at F pile, water was observed to be dripping from the aluminum sample casings. As this indicates a leak into the sample compartments from the water cooled magazine, the entire contents of the test hole were discharged. These casings contained both pile grade graphite monitoring samples and experimental material. Their being irradiated wet has caused difficulty in freeing the samples from their casings. After physical measurements have been made on the pile grade graphite samples they will be recharged into an available water cooled test hole in KE Pile. The leaking facility at F Pile is scheduled for removal by Special Irradiations personnel.

Stored Energy

A delay in the construction of the new stored energy calorimeter has been encountered because of the difficulty in obtaining certain parts. It was therefore decided to rebuild the old calorimeter which was damaged when a short circuit caused overheating. Modifications were made simultaneously to the power supply and instrumentation system to allow two different instrument resolutions thus allowing more accurate power measurements. One test sample has been run to 900 C without incident in the rebuilt calorimeter preliminary to making measurements on pile graphite core samples.

Thermal Annealing of Irradiated Graphite

Thermal annealing of graphite samples irradiated under PT 403 has been completed with the annealing of a sample exposed to 464 MD/CT at 184 C. Very little C₀ damage was accumulated in this sample. Damage was released throughout the range of activation energies from 36 to 100 kcal./g.-atom.

When high exposure, cooled test hole samples are analyzed by the same method that has been used in this work to date, difficulty is experienced because of the large changes that occur in the breadth of the 002 reflection peak from which the C₀ parameter is taken. A different method has been used to obtain an approximate activation energy curve for the release of C₀ damage from greater than 700 MD/CT samples. This method consists of measuring shifts in the position of the 002 reflection following isothermal anneals of about 45 minutes while the sample is in

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the diffractometer. Changes in the crystallite size, L_c , are also observed by this method. Analysis of a 2291 MD/CT sample was carried out and the observed results can be explained by a plausible mechanism. This mechanism postulates the spreading of the crystal planes and breakup of the crystallites as a result not only of interstitials and vacancies but also from defects consisting of clusters of interstitials and vacancies. Annealing of the samples shows a correlation in the recovery of C_0 damage and crystallite size, with a rapid rate of change in C_0 occurring simultaneously with regrowth of the crystallites. The hypothesis is consistent with current thinking in the field but requires additional data for confirmation.

Graphite Piston Expansion

In an attempt to determine the cause of swelling of graphite pistons used in the 200 Area pulse columns, ten parallel-cut and ten transverse-cut samples were soaked in two molar nitric acid for two weeks. Property changes were measured after the soaking and after drying over sulfuric acid. The observed changes are listed in Table I along with the obtained standard deviations, $\bar{\sigma}$. Most of the changes were so small as to be barely detectable.

TABLE I
PROPERTY CHANGES IN NITRIC ACID SOAKED GRAPHITE

	Transverse Samples		Parallel Samples	
	$\bar{\sigma}$	$\bar{\sigma}$	$\bar{\sigma}$	$\bar{\sigma}$
Length Change	0.058	0.012	0.001	0.000
Weight Change	0.020	0.010	-0.005	0.001
C_0 Change	-0.21	0.04	-0.37	0.05
Thermal Conductivity Change	-4.2	1.0	-4.1	1.2
Electrical Resistivity Change	-4.5	0.6	-6.7	0.9

The slight increase in sample length cannot be due to penetration of nitric acid between the crystal planes since the C_0 distance actually decreased slightly. This leaves the possibility that the expansion is due to intergranular penetration. The fact that the thermal conductivity and electrical resistivity both decreased may be due to residual HNO_3 or nitrate ion left in the graphite samples.

Pile Disaster Poisoning System

Boron content measurements have been completed on the previously described BF_3 impregnations of graphite. The results indicate sufficient boron deposition to prevent pile runaway for all runs at 800 C or greater. The experiments which tested the permanence of the boron in the graphite showed no decrease of boron content after being flushed with helium at 600 C for 67 hours. Tests of the impregnated bars which had been slabbed in order to measure the depth of boron penetration were erratic. These bars are being remeasured in the 305 pile.

Physical Properties Measurements

X-ray parameter measurements were made on forty graphite samples from a temperature graphitization series produced by National Carbon Company. Five of the samples are unirradiated and the others had received cold test hole irradiation. Sixteen thermal annealing runs were made over the temperature range of 75 C to 1000 C. The graphite sample annealed had a cold test hole exposure of 2291 MD/CT.

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Final thermal conductivity runs on twenty graphite piston samples were made. The samples had been soaked in an HNO_3 solution and difficulties in determining thermal conductivity were overcome by drying the samples over concentrated H_2SO_4 in a desiccator.

High Temperature In-Pile Heater

Thermal insulation tests were made using a half-scale laboratory mock-up of the proposed heater design. J. T. Baker Company reagent grade aluminum oxide having particle diameters from 30 to 150 microns was tested for the insulating material. Temperatures up to 1100 C were achieved at which point the nichrome heater winding burned out. Preliminary inspection of the test data indicates that this material will be suitable for use in the in-pile heater.

Irradiation of Plastics and Elastomers

Equipment has been installed at the 105 F gamma pits for the irradiation of plastics and elastomers at various controlled elevated temperatures. The first irradiation at 150 C should reach an exposure of 5×10^7 roentgens during September.

The September issue of Nucleonics Magazine will contain an article "Plastics and Elastomers for use in Radiation Fields" which describes irradiations up to 3×10^8 r at room temperature.

Radiation Effects on Organic Coolants

A production test for capsule irradiations of organic liquids has been written by Special Irradiations Unit (PT-105-545-SI) and is being circulated for approval. Capsules and carriers for the initial irradiations are being fabricated to be ready during September. The first irradiation will take place in the 2A general purpose test hole at KW.

Methods of measuring property changes of these samples after irradiation are being evaluated. Shielded and hooded facilities are being installed in Room 45B of 326 Building and the 3730 Building.

PILE GRAPHITE STUDIES

Pile Distortion - KE and KW Piles

Vertical height traverses were taken in the top center traverse hole on August 13 and August 17 at KE Pile and KW Piles, respectively. Both traverse profiles show a peak between 8' and 16' and a second peak between 32' and 40' from the front Van Stone flange. The maximum deflection of each peak occurs at the end of the first and seventh tube block, and amounts to 0.3 in. and 0.2 in. respectively for each pile. The center portion of the profile, 16 feet to 32 feet from front Van Stone, shows little or no change. At first glance, it would appear that the extensive coring pattern used in the K Pile stack has not prevented graphite stack distortion. However, a review of C, H, and DR Pile distortion indicates the same trend of a small amount of fringe distortion occurring in the first year of operation. It would thus appear that some filler block expansion will occur in the fringe zone of a pile despite the coring pattern used and the extent of such expansion will be dependent upon the length of time spent in bringing the pile to full

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power level. In any case, the expansion at K Piles is not of a significant magnitude, nor is the extent of the expansion expected to increase appreciably over that indicated by the present vertical height traverses.

Graphite Process Assistance

The recent long operating periods at B Pile have caused some control problems which required the review of the graphite limits and operating conditions. During July and August, B Pile has operated with a maximum tube power of about 670 KW and a total power level of approximately 800 MW. At this power level and for a maximum graphite temperature of 500 C, helium concentrations of 20 to 30 per cent are predicted. Actual helium concentrations during the two months varied from approximately 30 to 55 per cent over a given operating period. After reviewing the meager graphite temperature data from B Pile, the operating conditions which existed at B Pile in January and February, 1956, and the present operation of D and F Piles, it is concluded that B Pile was operating with graphite temperatures sufficiently low to cause fringe zone expansion. The pile was shut down for a minimum outage so that poison charges could be made. It was recommended that replaceable thermocouple stringers be installed at the tube outage of August 20. During the outage, one stringer was installed, vertical height traverses and probing of tubes was scheduled but results are not yet available.

A letter containing specific recommendations as to thermocouple replacement at all piles is being issued.

Bore Diameter Equipment

The traversing heads, calibration sleeves, and mounting brackets for the bore diameter equipment have been fabricated. Arrangements were made for a Hanford engineer to visit the Schaevitz Engineering plant to test and calibrate the recording equipment which is being purchased from them.

RECIRCULATION TECHNOLOGY

E-Loop Recirculation Studies

Data from Run 16 were obtained showing corrosion rates substantially as predicted by the effective temperature correlation. For a power of 19 KW/8 inch slug and a surface temperature of 195 C the maximum observed corrosion rate was 2.90 mils/month. In general, the measured rates ranged between 1.5 to 2.9 mils/month in the high temperature region of the tube (160 to 200 C).

Run 17 accumulated a total of 28 days exposure at an average outlet temperature of 190 C and a pH of 5.5 to 5.7; pH control was hampered by the system leak rate of 200 to 250 gal./day. The run is scheduled to be discharged September 9 and the data from the E-metal slugs should provide information on the effect of high slug powers, 42 KW/8 inch slug, at high temperatures.

The test section data were obtained and a plot of corrosion loss vs. time provided the following rates for the different alloys.

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M-388	0.45 mil/month
M-400	0.49 mil/month
X-2249	0.60 mil/month
2S	0.56 mil/month

These rates occurred in coupons exposed to 7.5 ft./sec. water at 190 to 198 C. In addition, autoclave data were obtained showing no appreciable weight loss at 15 days in loop water. In deionized loop water, at 15 days very little weight loss was obtained and at 31 days a rate of 0.06 mil/hr. was obtained. Indications are that velocity plays an important role in the corrosion of aluminum in the 0 to 2 ft./sec. region. The effect of velocity will be studied further in the ELMO Loops and H-Loop to confirm this proposition.

To evaluate the proposition that an excess of Al ion will be beneficial to the corrosion of Al metal, the H-Loop is being converted to send a small stream of high velocity (7.5 ft./sec.) loop water over microslugs (260 mils diameter) contained in a miniature test section of 3/8 inch tubing.

Approximately 1 ppm. of Al ion will be added to the test section such that the H slugs will be exposed to both treated and untreated water. Analysis of corrosion losses should determine any benefits of this addition.

Interim report 6 is approximately 50 per cent completed and the rupture examination report is about 75 per cent completed.

KER Activities

Pressure drop and charge-discharge tests have been completed on all types of proposed KER fuel elements. Mechanical strength tests of the projection studs and rails are nearly complete, and a report on the test results is in preparation.

Construction of the fluid polariscope for determining flow lines around fuel elements is now in progress.

Two defected KER prototype slugs were rupture tested. One standard diameter element with stud projections was tested at 260 C for 24 hours. No flow disturbance was observed; however, visual observation showed that approximately 50 per cent of the flow annulus was blocked. The slug was pushed from the tube with a force of 150 pounds. The second slug, which was railed, was run at 240 C for five hours. About 1050 pounds of force was initially required to move the slug in the tube; the force then remained constant at 710 pounds until the slug was discharged.

A preliminary draft of the KER Production Test was completed and circulated to interested units for comment.

A correlation of H-Loop corrosion data was made to enable the prediction of aluminum corrosion rates in the KER geometry from a knowledge of the local water temperature and specific slug power generation.

Technical bases for the modification of one KER loop for in-pile boiling tests have been determined and are being transmitted to Design.

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Organic Coolant Development

The organic coolant in-pile test loop progressed with completion of the in-pile test section, approval of the production test for irradiation of MIPB, and procurement of the necessary organic material. A delay was encountered when the loop pump failed during preliminary testing. Additional organic test loops are being fabricated for heated wire tests and component tests. Solubility determinations of water in MIPB at various temperatures have been initiated.

ELMO Loop Development

ELMO-6 operated continuously except for coupon discharges. Test conditions are 250 C, pH 4.5, velocity 20 ft./sec.

Installation of the ELMO-7 KER prototype loop was essentially completed and shake-down operation was begun. This loop is designed to pilot KER operation and provide corollary out-of-pile corrosion information.

Preliminary design of ELMO-11, a loop for corrosion testing with various qualities of steam, has been completed. Layout and detail design work are underway.

Detailed design of the component test loop continued.

PILE COOLANT STUDIES

Production Tests

Corrosion rate measurements from four slug charges discharged from 105-F on July 14, 1956, are not yet available. Relative corrosion rates of carbon steel in pH 7.0 and 7.65 process water as measured by the Corrosometer instrument were inconclusive. Some indication was received that the carbon steel corrosion rates in pH 7.0 process water is from 1.2 to 2.3 times the corrosion rate in pH 7.65 process water. However, Corrosometer readings could only be obtained for three operating days, and the readings obtained were erratic. Other corrosometer probes recently ordered are expected to provide corrosion measurements over a 20 to 30 day operating period.

Document HW-44002, "Supplement A, PT 105-554-E, Evaluation of pH 7.0 Process Water", received final approval on August 1, 1956. Operation of 105-F reactor under this supplement was initiated on August 1, with process water pH on the near (control) side adjusted to 7.3, while the far (test) side pH remained at 7.0.

Document HW-44110, "Preliminary Evaluation of Separan 2610 for Process Water Treatment", was issued this month.

Qualified verbal approval for the use of Separan 2610 in treating drinking water at Hanford was received from the General Electric Health and Safety Section on August 7, 1956. This qualified approval was received after discussion of potential Separan toxicity between representatives of the Dow Chemical Company, Washington State Department of Health, and interested Hanford people, on July 31, 1956, and the receipt of subsequent correspondence from the U. S. Public Health Service. Complete and unqualified written approval is expected after further correspondence with the U. S. Public Health Service.

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Calculation of the factor of safety for the use of Separan 2610 in treating Hanford drinking water is based on a maximum Separan 2610 feed rate of 0.04 ppm. prior to filtration of the water, and a safe human monthly dosage level of 100 to 500 milligrams of Separan 2610 (containing one per cent Acrylamide impurity) per kilogram of body weight. The minimum monthly safety factor calculated on this basis is in the range 105,000 to 525,000. Since Separan addition is required only during approximately six months of each year, and maximum addition rates are not required during most of this period, the yearly safety factor is approximately three times this monthly safety factor. A verbal commitment was received from the manufacturer on August 16, 1956, to supply Hanford with Separan 2610 with maximum Acrylamide impurity concentration of 0.2 per cent. If this commitment is realized, the Hanford safety factor will be further increased by a factor of five.

Pile Process Tubes

Fifteen pile process tubes were examined in the basin facilities and forty-one tubes were examined in the metallurgy laboratory during the month.

No unusual corrosion was observed. Tubes 1777-F and 1877-F were leakers caused by outside corrosion. The wall thickness in the area of these leaks averaged 35 mils. Tube 1378-H had a slit about two inches long located 11 feet from the rear Van Stone flange. The wall thickness around the slit was 15 mils. Very light corrosion was observed on the outside of the tube around this slit.

Testing of the Vidigage for underwater wall thickness measurements by ultrasonics looks promising. The difficulty appears to be in getting a good crystal-to-metal contact. A new crystal which is expected to perform better should arrive any day.

Seventy-four tubes scheduled for replacement and two routine examination tubes were probologged during the month. H tubes examined had wall thicknesses quite close to that indicated by calculations and in almost all cases were below the 30 mil replacement criterion. F-Pile fringe zone tubes differed considerably from the calculated wall thickness. Tubes in the upper half of F Reactor showed considerably less outside corrosion than tubes in the lower half of the reactor. Nozzles inspected at the time of probing were found to be full of barnacles except for a few cases where small and possibly old barnacles were found.

Zirconium Process Tubes

During the month a research and development contract, DDR-6, was signed by Allegheny Ludlum Steel Corporation. The contract calls for the development of quantity production techniques for the manufacture of ribbed Zircaloy-3 process Tubes. A total of sixty Zircaloy tubes are to be fabricated under the contract. Allegheny Ludlum will extrude ribbed blanks using glass lubricant and Tube Reducing Corporation will perform the final tube-reducing operation under a sub-contract to Allegheny Ludlum. It is anticipated that the extrusion billets will be fabricated by forging to size, cutting to length, and piercing to minimize metal loss from billet boring. The initial lot of 8 billets, approximately 3300 pounds, to be used by Allegheny Ludlum on the above contract has been shipped from the Bureau of Mines, Albany, Oregon plant.

Superior Tube Company has scheduled during the month the extrusion of the first ten billets on their contract DDR-5. This contract, as Allegheny's DDR-6, calls

for development of fabrication techniques for the quantity production of ribbed Zircaloy-3 tubes. Chase Brass is performing the extrusion of copper-clad billets under a sub-contract to Superior.

Three Zircaloy-2 ribbed tubes received from Superior Tube Company in July were probologged and pressure tested during the month. All tubes were found to be sound, withstanding a 500 psi. hydro-static test. These B, D, F sized tubes are 49', 46'8" and 44'11" long. A dent found between the ribs at 17'10" from one end of the shortest tube was apparently formed in the tube during handling. It may be necessary to remove this defect by cutting and butt welding the tube. In addition to the ribbed tubes, four ribless unalloyed zirconium tubes were pressure tested. All withstood a hydro-static 500 psi. test. Two sections of ribless unalloyed zirconium tubing are being butt welded to produce a 49' tube. When completed this tube will bring to four the number of ribless tubes greater than 46' long that are on plant and suitable for use in-pile.

Aluminum Process Tubes

Fifty pieces of 6063 ribless B-D-F tubing were fabricated by Alcoa at their Lafayette, Indiana, plant during the month. These tubes are awaiting inspection approval before shipment to Hanford.

A purchase order has been issued to Alcoa for the procurement of 12 ribless, M257 alloy, B-D-F sized process tubes and 6 ribless, KER sized, M257 alloy tubes. These tubes fabricated in the new high temperature powder metallurgy alloy are to be used for research and development work on in-pile facilities at Hanford.

Flow Laboratory Studies

2S aluminum Minislugs exposed in zirconium Minitubes at 115°, 135°, 155°, and 175°C using pH 6.0 process water have been discharged at 42, 62, and 72 days exposure. However, the corrosion rates have not been obtained because the scale could not be removed by the present methods. The scale was still adherent after treatment with 10 per cent oxalic acid at 70 C and electrolysis in various solutions.

Corrosion rates for 2S and M-388 aluminum jacketed slugs exposed at 135° and 155° in pH 6.0 process water have not been obtained because of the same difficulties with scale removal.

Projection slugs exposed in pH 7.0 process water at 125° have been discharged after 64 and 79 days exposure. Corrosion rates compared favorably with normal slugs but are not too reliable because of previous exposure in another tube.

KE-KER SEMIWORKS

KE-KER Semiworks

Activities during the month included the training of new personnel, planning for the start-up, and performance of Acceptance Test Procedures for the KER facility and the operation of 1706-KE water studies semiworks.

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1706-KE Water Studies Semiworks

Twenty-four and nine-tenths hours of outage time was charged to PT 105-550-E, "Operation of the In-Pile Facilities of the 1706-KE Semiworks", as a result of two scrams during the month. The first scram, August 1, 1956, occurred when an electrician fractured an indicating light on process pump #2. The cracked bulb resulted in a short, dropping the pump off the line and scrambling the reactor. The reactor failed to recover due to a malfunctioning selenium rectifier of the horizontal control rod circuit and the production test was charged with a 24-hour minimum outage. The second scram, August 11, 1956, occurred when semiworks personnel were attempting to increase the flow on tube 5063 by opening the by-pass valve. A momentary pressure surge caused a high panellit trip, resulting in a reactor shutdown. Scram recovery was initiated after an outage of 53 minutes. During the last several months the KE reactor has been carrying out gradual step-wise power level increases with resultant increases in process water pressure. It was necessary to operate the 1706 air operated control valves near the completely opened position, allowing for very little control of pressure, with a result that a certain amount of process water was flowing to tube 5063. To allow for greater flow and pressure control the seats of the air operated control valves were ground out to 29/64" diameter, vice the former 3/8" diameter. Good control has been experienced since this temporary modification; however, new parts have been ordered for permanent modification of the valves.

Filter tests were temporarily discontinued due to a loss of filter media during the back-wash cycle. As soon as Anthrafilt is available, the series of tests will be resumed.

The fabrication of the out-of-pile organic recirculation loop (ORA-1) to determine coking and decomposition characteristics of organic coolants was initiated during the month. Fabrication of the in-pile and out-of-pile components for Organic Recirculation Apparatus #2 (ORA-2) were completed during the month. Minor difficulties, primarily due to viscosity and density of the organic coolants, necessitated several changes in the out-of-pile sections of the loop. The loop, designed for the study of radiation damage to organic coolants, will be ready for in-pile installation by month's end.

KER Zirconium Tubes

Successful hydrostatic tests at 4000 psi. indicate that a threaded nozzle-to-tube fitting will be suitable for use with the KER Zircaloy-2 process tubes. The screwed fittings will be further tested on EIMO-7 during September. The five full length zirconium tubes are in the process of being radiographed at month's end. Preliminary information indicates a serious defect at the base of the rib in the ribbed tube. Additional sections of KER tubing produced by Bridgeport Brass will be on plant during September for evaluation and back-up for the present tubes.

Recirculation Test Facility (KER)

The beneficial use date for the out-of-pile portion of this facility is now set for the middle of September and the tie-in outage for mid-October with complete beneficial use by November 1, 1956. A rough draft of the KER operating manual is

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90 per cent complete at month's end. KER piping and mechanical work is substantially complete. However, difficulties with the electrical and instrument systems have delayed the performance of the Acceptance Test Procedures. At month's end Acceptance Test Procedures are underway for Cell #4.

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FUEL TECHNOLOGY SUB-SECTIONPROCESS TECHNOLOGY

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Gas Studies as Related to Slug Canning

Gas which was extracted from large unbonded areas in canned slug assemblies containing slug cores from Z, M, K, and V lots was analyzed. Large quantities of carbon monoxide were present in the voids in all but Z (recovered) lot slugs in which 3 out of 4 slugs had no detectable amounts of CO. Besides large amounts of hydrogen, most of the samples contained entrapped air. Gas extracted from bare pickled cores from M, K, V, Z, and VZ lots are being analyzed to determine if there is a difference in the CO content in these types of bare cores.

Fuel Elements With Total Al-Si Penetrations

Three fuel elements with artificially produced total Al-Si penetrations, ranging from 10 to 30 mils in diameter, passed the penetration tester. An additional three pieces were canned with a slow quench, resulting in numerous additional penetrations within five mils of the jacket surface. The tester detected some, but not all, of these penetrations. The pieces will undergo additional tests.

Evaluation of "C" Alloy Fuel Elements

The 300 Area portion of PT 105-58MT has been completed. Three hundred single-length, hot-press tru-line slugs and 162 double-length unbonded "C" slugs have been shipped to the pile areas.

Preliminary Evaluation of Slugs With Thin Caps and Can Bases

A total of 451 fuel elements for PT 105-631A-74MT were charged into the autoclaves. The welding yield was 80 per cent. The majority of the rejects were poor bonds caused by braze layer porosity.

Preliminary Evaluation of Fuel Elements Welded in the Horizontal Position

The proposed fully-automatic slug welder for I & E slugs (HWS-5868) is designed such that fuel elements are welded in the horizontal position. Development test DT 105-643-A provides for an in-pile evaluation of horizontally-welded slugs. Welding yield on the test slugs was 82 per cent, the majority of the rejects being well over-hang rejects; however, it appears that many of these rejects can be eliminated by welding machine adjustments. Eighty-eight horizontally-welded pieces and sixty-nine control pieces are available for charging during September.

Canning Tests Using Ni-Al (M-388) Components

A test was run in which 940 slugs were canned in M-388 alloy components to determine the optimum canning procedure for M-388 components. Approximately one-half of the slugs were canned on a 45 sec. cycle and one-half on a 50 sec. cycle. One-half of the group canned in each of the two different cycle times were vibrated and one-half were unvibrated. About 200 good slugs were examined for non-wetting and the extent of void areas by mechanically stripping the M-388 jacket from the slug core. The slugs that were canned using vibration (both 45 and 50 cycle) had less porosity and fewer non-wet areas than slugs canned using no vibration. Any

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W-388 components used in the future should be canned using vibration with either a 45 or 50 cycle. The acceptable slugs are being held for use in production tests.

Solid Enriched Slug Cores

One hundred and sixty-three acceptable eight-inch solid enriched (1.44% U_{235}) slug cores were obtained out of 200 pieces canned. Those slugs will be used as comparison standards for the following enriched slug production tests:

1. PT-105-639-A-73MT, Evaluation of I & E Slugs Operating at High Specific Powers, HW-43078A.
2. PT-105-637-A-77MT, Determination of Optimum Cores Slug Hole Size, HW-43897A.

PROCESS DEVELOPMENT

Induction Preheating of Canning Sleeves

A proposed method for increasing the production rate of the Al-Si canning furnaces is to preheat the can-sleeve assemblies by induction prior to submerging in the canning bath. Investigation to determine the optimum frequency in the range of 60-3000 CPS for induction preheating can-sleeve assemblies is in progress. A request for the negotiation of a development contract with an off-site vendor to conduct development work and recommend a low-frequency, production type, induction-heating unit is in preparation. On-site development work is being performed on the 200 kw, 3000 cps, Tocco induction-heating unit in the 314 Building. Initial tests were designed to establish the induction coil configuration which will uniformly heat the can-sleeve assembly. Coils tested to date have produced uniform heating in the middle eight inches of a ten-inch sleeve.

Bonding Studies

Fuel elements assembled by lead-dip, triple-dip, and hot-press canning methods were sectioned, metallographically examined, and baked in glass ampoules for varying lengths of time at 250, 300, 350, 400, and 450 C. The samples were taken from the ampoules, the bonding microstructure re-examined, and the bond strengths determined by tensile tests. Large variations in bond strengths, even before baking, were observed along the lengths of individual slugs, and also from one slug to another. Bond strengths before and after baking are being correlated with the bond microstructure and thermal stability, and with fuel element canning variables.

Hot Press Canning - Etch Studies

In an effort to evaluate the effect of etch conditions on the bond strength of the finished piece, nickel-plated uranium wafers have been hot-press canned and are being prepared as tensile specimens. The variables which are being tested include heavy versus light etch at ambient room temperature and at 60 C. This test is a re-evaluation of decisions made early in 1955 to adopt the light etch bath at room temperature in preference to the heavy etch at elevated temperatures.

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Irradiation of Dingot Slugs

Production Test 105-608-A-56-MT was written to determine the in-pile stability of dingot uranium having various mechanical and heat treatment histories. Of sixteen tubes charged at 105-B, three have been discharged at 600 MWD/T and examined. A preliminary analysis of the data indicate that the slugs fabricated from forged billets behaved the same as the control slugs. The two types of slugs extruded directly from the dingot grew more in diameter and showed greater ellipticity than the control slugs. Those slugs which received a beta heat treatment before extrusion were the only ones which warped appreciably more than the control slugs. These comparisons were made on the basis of three tubes out of sixteen. The relative effect of forging and billet beta heat treatment will be better defined when all tubes have been examined.

Dingot slugs which were outgassed in the rod form at NLO have been shipped to 105 D, and are awaiting charging. This metal will be irradiated under the provisions of PT 105-608-A-56MT Supplement A. Autoradiographs of this metal showed less braze porosity than the ingot control slugs.

DEVELOPMENT OF NEW FUEL ELEMENTS

Cored Fuel Elements

Supplement E to Production Test 313-47MT (HW-33189) is being issued to authorize fabrication of production quantities of $\frac{1}{2}$ " drilled cored slugs sealed with aluminum end plugs for in-pile evaluation.

The superiority of $\frac{3}{8}$ " cored slugs with aluminum end plugs compared to solid slugs as measured by resistance to split type core failures was demonstrated by Production Tests 105-593-A and 105-570-A. As an increase of split type failures may be anticipated with increased pile powers, the cored slug geometry may satisfy future operating conditions. However, the dimensional stability of $\frac{3}{8}$ " cored slugs appears inferior to that of solid material with a higher incidence of stuck charges and side failures indicated by preliminary evaluation of data available on material lot charged under PT-47-MT Supplement D.

Results from PT-105-607-A showed that $\frac{3}{8}$ " cored slugs had a rupture rate at least 125 times greater than the $\frac{5}{8}$ " cored slugs at the 95% confidence level and dimensional distortion appeared to be less in slugs with the larger core hole diameter. Lot charging of $\frac{1}{2}$ " cored slugs has been authorized as a compromise between anticipated improved rupture resistance and dimensional stability and reactivity loss associated with increased core hole diameters. It is anticipated that canning of $\frac{1}{2}$ " cored slugs will commence on September 4.

Internally and Externally Cooled Fuel Elements

The twenty, anodized, hot-pressed, I & E fuel elements, selected as the C Pile partial tube load for in-pile outlet water temperature tests (PT 105-625-A-70MT), have been autoclaved and are ready for pile charging when approvals are secured.

One hundred enriched (1.44% U_{235}) uranium and 1155 normal uranium I & E pieces were dip-canned this month. This brings the total of canned enriched I & E slugs to 670, of which 64 are scheduled for pile-charging under PT-105-624-A-73-MT. The remaining enriched pieces, including rejects, are for exponential

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physics experiments. The 1155 normal uranium slugs were canned in two groups; one group of 500 slugs for development of welding techniques, and the other group of 655 was part of the proposed I & E canning program. Sixty per cent of the 500 slugs passed weld inspection.

The welding yield for I & E fuel elements has been increased substantially from previous yields that averaged about 40 per cent to yields of approximately 80 per cent. It was concluded during the series of welding tests that the increase in yield was due to: (1) better gas shield coverage, (2) reduced welding current, and (3) reduced amounts of porosity and impurities in the fuel element bonding layers.

Facing Operation

Experimental facing operations on I and E fuel elements have been continued on the turret lathe in 314 Building. The object of this work is to provide proper tooling for facing and tru-lining I and E fuel elements produced in the semi-works, and subsequently for the Acme-Gridley automatic turret lathes in 313 Building. Approximately 700 I & E slugs were tested during the month on I & E laboratory penetration test equipment. The average reject rate at an estimated 20 mil sensitivity was 19 per cent. Sixty-nine per cent of these rejects were border line cases. With the instrument system now used, bumps and wrinkled surfaces still give signals which cannot be distinguished from those due to penetrations. Thus an unknown number of the rejects are due to these surface effects.

The I & E slugs were also tested for unbonded areas with new mechanical equipment assembled in the laboratory for that purpose. This mechanical gear is also being adapted for penetration testing in the laboratory.

Construction drawings for the 306 building automatic conveyor for I & E bond and penetration tests have been completed and transmitted to the Project Section. Technical Shops is preparing an estimate for expedited construction of a prototype of this conveyor. This will be used in the laboratory to facilitate debugging and for laboratory testing of I & E slugs. An older conveyor now in the laboratory is being fixed up for temporary use in the 313 building.

Vacuum canning of I & E fuel elements has been continuing. Forty pieces were canned, welded and sent through standard production, non-destructive testing procedures. An attempt is being made to correlate bond strength, continuity, and microstructure with such variables as silicon concentration of Al-Si, degree of vacuum, and pouring temperature. A production test for vacuum canned fuel elements is being planned.

Wafer Fuel Elements

Two I & E, wafer fuel elements, four and eight inches in length, respectively, were fabricated by the lead-dip process for evaluation in the Materials Testing Reactor. The 3/16-inch thick uranium washers in the four-inch fuel element were fabricated by punching; those in the other element were machined from rod. Both fuel elements have M-388 Ni-Al alloy jackets.

The power level at which these elements operate in the Materials Testing Reactor will be determined from two thermocouples located just above the fuel elements, and two just below them. Thermocouples used in the previous Materials Testing Reactor irradiation were malfunctioning; the thermocouples used in the present test are of a new type, insulated and protected by a swaged, MgO-stainless steel jacket.

Projection Fuel Elements

Further development work was pursued to improve the quality and reproducibility of stud-welded ribs on projection fuel elements. High speed cinematography was employed to study the nature of the arc occurring when the rib is welded to the fuel element jacket. From these studies it was observed that: the arc duration is of the order of 2-4 milliseconds; no pre-ignition occurs prior to the arc; direct physical contact between the rib tip and jacket is required to initiate the arc; and the rib strikes the jacket at a velocity of about 800 inches per minute. As a result of these observations, it can be concluded that because of the rapidity with which the arc travels toward the jacket and the short duration of the arc, there is inherent in the Graham stud welding process factors conducive to misfires. To overcome these factors a scheme to provide some slight arc pre-ignition is required. A scheme using an interrupted travel stroke where the rib travel is momentarily arrested when the tip first touches the jacket, will be evaluated in the near future.

On two fuel elements with ribs attached by the sonoweld process, no localized corrosion in the vicinity of the ribs was noted after a 30 day exposure to 125 C process water.

An extensive metallographic examination will be made after an additional 30 days exposure when any possible crevice corrosion should be more easily detected.

The following pieces have been shipped to Recirculation Technology for evaluation in the KER and ELMO 4 loops: (1) Six standard diameter, lead-dip-canned, cored uranium fuel elements, M-329 jackets with trapezoidal-shaped rails attached by stud welding; (2) Seven standard diameter, cold-canned, uranium fuel elements, M-329 jackets, with cylindrical studs attached by stud welding; (3) Sixty-two solid aluminum dummies with cylindrical studs.

Water-Mixing Fuel Elements

It has been proposed that water-mixing fuel elements be assembled in thick-base cans from which the projection could be machined after canning by standard methods. The first pieces produced had the conical projection machined from a large cap boss and the presence of the finished projection interfered with welding of the slug closure. Canning tests have demonstrated that a fuel element with the necessary base thickness can be canned with a standard 45 second cycle. An initial lot of suitable aluminum cans (H-3-8747) is on order.

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DECLASSIFIEDMATERIALS DEVELOPMENTCorrosion

Examination of weight-loss curves for samples autoclaved 4-6 months in 350 C deionized water indicate corrosion rates are decreasing with time. Rates do not differ much from alloy to alloy. The best average value for the corrosion rates of aluminum alloys resistant to intergranular attack after 6 months is approximately 4 mils/year.

The study to determine which components of pile water affect the corrosion of aluminum is continuing. Samples of M-329 aluminum were exposed to waters of different composition for 2 weeks at 92 C under conditions of low flow. The solutions contained up to 100 ppm of Cl^- , HCO_3^- , NO_3^- , SO_4^{2-} , H_2O_2 , and PO_4^{3-} . The phosphate was added as K_2HPO_4 and KH_2PO_4 and the other ions were added as sodium salts. Other solutions contained 100 ppm of HCO_3^- and were adjusted to various hydrogen ion concentrations with CO_2 and NaOH . With only one exception, the tests to date indicate that only the pH affects the corrosion of aluminum. The one exception was for 100 ppm PO_4^{3-} (added as KH_2PO_4) at pH 6.1, in which case the weight loss of the samples was less than one-tenth of that normally observed during a 2-week exposure at this pH.

The corrosion product formed on aluminum in water at 150 C and higher cannot be removed with the usual chromic-phosphoric acid stripping solution. Consequently, in order to measure the penetration on high temperature corrosion samples, the aluminum metal is dissolved away from the corrosion product by refluxing in an iodine-methyl alcohol solution. To obtain a material balance over the corrosion process, these undissolved corrosion products must be analyzed for aluminum. The samples dissolve rapidly in hot concentrated phosphoric acid, to give a solution very similar to those analyzed successfully by the method of Groot, Peekema, and Troutner.⁽¹⁾

KER Size Zirconium Alloy Process Tubes

One Zircaloy-2 billet was successfully extruded and tube reduced to form a 56-ft. length of ribless tubing. Three salvaged tube blanks, from which cracked ribs had been machined, were successfully tube reduced to provide three lengths of ribless tubing which were 46', 24' and 23' long respectively. Preliminary inspection did not reveal any material failures.

Two 50-foot lengths of ribless, KER size, zircaloy process tubes with internal fabrication defects were made usable by employing inert-arc butt welding techniques. Each tube had a small circumferential fabrication tear that extended obliquely through the tube wall. A section six inches long that included the defect was removed from each tube. The two resulting lengths from each tube were bevelled (60 degrees included angle and 1/32-inch root face) at the ends and butt-welded together, using inert-tungsten-arc welding procedures previously employed on BDF size zircaloy tubes.⁽²⁾ Radiographic examination of the two welded tubes show the joint to be fully penetrated and to contain no porosity or significant contaminants.

- (1) C. Groot, R. M. Peekema, and V. H. Troutner, Determination of Aluminum in Chromic-Phosphoric Acid Solutions, HW-40497 (Unclassified) 1-16-56.
- (2) J. W. Lingafelter, Fifty-Foot Zircaloy Process Tube by Inert-Arc Butt-Welding, HW-43049, 5-14-56.

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BDF-Size Zirconium Alloy Process Tubes

The last five billets for Superior Tube Company's Contract AT-(36-1)-26 were extruded by Chase Brass Company to form 0.140" wall tube blanks for double tube reducing. Double tube reducing has tentatively been scheduled by Superior Tube Company for 8/29/56.

Ten Zircaloy-3a billets have been canned for extrusion at Chase Brass Company on 8/22 for Contract DDR-5 (order for 60 ribbed tubes).

Zirconium Alloy Fuel Element Cans

Bridgeport Brass Company has completed the final drawing and annealing processes on about 800 shells. Final inspection and leak testing of the shells are in progress.

APMP Aluminum Alloy M-257 Hardness

A preliminary study of the hardness of M-257 sheet material revealed that the Rockwell F hardness of the alloy remained unchanged after cold rolling more than 50 per cent and after annealing for one hour at 580°C.

TESTING METHODS AND EQUIPMENTPenetration Test

Two modifications to the penetration tester are now being evaluated. The photocell circuit which was installed on one production line to eliminate the slug sensing switches and their frequent adjustments has operated satisfactorily for three weeks. However, difficulties have been experienced with the new alarm trigger circuit which is designed to reduce variations in trip level sensitivity encountered with the present equipment. Most of the troubles result from electrical transients which it is believed can be corrected.

Metal Quality Test

About 825 tons of metal have now been tested for the Metal Quality Test evaluation program. Attempts to double the conveyor speed were unsuccessful because of uncertainties in the instrument performance. Some maintenance difficulties are being experienced due to a shortage of spare parts and lack of trained personnel on swing shift.

Methods Development

Professor A. S. Nowick of the Hammond Metallurgical Laboratory at Yale University visited HAPC August 13-17 for consultation on studies of internal friction in uranium. Results of his visit are being summarized in a separate report.

Electronic equipment has been designed to measure Young's Modulus, the Shear Modulus, and Internal Friction on irradiated fuel elements in the "C" basin. Design of the auxiliary mechanical equipment has been initiated.

The behavior of Lamb waves in aluminum cans has been studied with a view towards adapting this type of ultrasonic wave to the testing of fuel elements for unbonded areas. Results to date have shown that various modes of vibrations can be established in unbonded fuel elements from which the unbonds can be

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revealed. However, so far it has been difficult to determine test head adjustments that are suitable for all the various void configurations that are encountered in testing production slugs. The equipment is now being modified from a 5 megacycle system to 10 megacycles.

Various techniques for automated surface inspections continue to be studied with emphasis on the examination of the internal surfaces of I & E elements. Optical test show ambiguities which have not yet been resolved. The triboelectric effect was briefly examined as a means of detecting surface defects, but was dropped because of the difficulty in avoiding damaging the can surface with the test. Eddy current surface tests are now being developed.

IRRADIATION BEHAVIOR

Data on the comparative failure rates of solid slugs in 105-C, initially reported in June, (1) have been expanded to include all slugs canned January 1955 through June 1956. Results comparing K, M, and Z lot slugs qualitatively confirm those presented in the above reference:

1. M-lots have a 1.5 to 2-fold higher failure rate than K-lots.
2. Including March '55 canning, the performance of Z-lots and K-lots is about the same; excluding March '55 canning K-lots have about a 2-fold higher failure rate than Z-lots.

Quantities of the various types of standard production slugs irradiated were obtained from shipping records, since lot numbers of tube charges were not recorded. It was assumed that the proportions of slugs charged and rejected would be about the same for each type, and each month, and thus shipping data was sufficiently accurate to estimate slug failure rates for comparison on a relative basis. The range of values in above results, assumes an accuracy of ± 1 failure.

In comparing lot types, only slugs canned during the same periods were considered, thus eliminating, insofar as practical, quality differences due to canning process variance. It was also assumed slugs canned during a given period were subjected to about the same in-pile conditions. This appears reasonable, considering the large number of slugs of each type used in the evaluation.

A few of the K-lots contained in M-lot slugs, according to the published lot history records. Failure rates were not adjusted to allow for this inhomogeneity since the number of mixed M-lot slugs generally comprised < 1 per cent of the K-lot total.

PT 105-613-A-54-MT - Slugs from Delay Quenched Rods (Evaluation of dimensional stability of slugs from rods heat treated by a modification of current production practice)

Nineteen tubes of test material were charged into 105 KW on 6/28/56 and exposures of approximately 200 MWD/T have been reached. Each tube is latin-square loaded with slugs from rods with a delay after removal from the beta heat treating salt bath of 20, 35, 50 and 80 seconds prior to brine quenching.

(1) HW-43938-G, Pile Tech. Section Monthly Report, June 1956, page Fb 47

Three of these tubes are scheduled for discharge after exposures of 400 MWD/T, eight after 600 MWD/T, and eight after 900 MWD/T. Analyses of data obtained on the irradiated pieces will show the effect of the different delay periods, on the dimensional stability during irradiation.

Irradiation of Vertically Heat Treated Uranium

PT-105-610-A-60 MT was written to determine the relative dimensional stability of uranium slugs which have been machined from rods vertically heat treated in a salt bath.

The following five types of slugs were charged in a latin square loading:

Type	Position of Rod During Heat Treatment	Type Salt Bath	Delay Before Quenching	Quench Medium
A	Vertical	Chloride	14	Water
B	Vertical	Chloride	45	Water
C	Vertical	Chloride	60	Water
D	Vertical	Chloride	14	Oil
E	Horizontal	Carbonate	15	Water

Five tubes comprising a complete latin square have been discharged at 600 MWD/T and examined. The following preliminary conclusions are drawn from an analysis of the warp and diameter changes which occurred as a result of irradiation:

(1) no difference in behavior was observed between the slugs representing the different treatments; (2) there was no difference in behavior between tubes; (3) both the regular metal and test slugs warped significantly less than expected of normal metal at this exposure. Only 2% of the slugs in this test (including both standard and test material) warped more than 30 mils whereas normally 20% exceed this amount of warp at this exposure.

FACILITIES AND EQUIPMENT DEVELOPMENT

105-C Metal Examination Facilities

Calibrations and revisions to the Basin IV operating equipment are in process.

Trial photographs were taken with the slug surface camera to determine if the slit width is adequate to photograph bare slugs. The recording mechanism, which numbers each photograph for individual slug identification, was repositioned to function properly.

The ultrasonic equipment failed to function due to water leaking into the crystal cables. Each of the six crystal assemblies was dismantled, dried, and reassembled. Test results after reassembly indicated that the 5 and 7-1/2 megacycle channels were operating satisfactorily. The electrical portion of the 10 megacycle channel is faulty resulting in poor power transmission to the crystals. Efforts to locate and correct the trouble are continuing.

The underwater door to Basin III is being fabricated by plant maintenance personnel. After completion, the door will be installed by Minor Construction forces. The addition of the door will permit maintenance of equipment presently in Basin III, and installation of future equipment while the other Basins are operating.

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The fabrication of the optical profilometer is approximately twenty-five per cent complete. The completion date is scheduled for November.

Autoclaves

All the autoclaves in 314 Building have been tested and approved. The 363 C (680 F) autoclave is on stream. The 250 C and 300 C autoclaves are being loaded.

A new preheater design, in which a tube was heated by its own resistance to a low-voltage, high-amperage current, was mocked-up, tested and found very successful. It gave much higher output, much lower loss, and was more easily controlled than previous design. Equipment for permanent operation is on order.

The autoclave in 100-K is in routine operation, and the autoclave in 100-D has been scrapped.

During the past month, low flow rate test facilities have been added to the existing H-Loop dynamic out-of-pile test section. The new facilities consist of two autoclaves in parallel with the existing section and like it are located in the return circulation piping of H-Loop. The autoclaves differ from each other only in the time the water is held up before it contacts the corrosion samples. The variation in hold-up time is designed to determine the effect of any short-lived free radicals.

PROJECTS

Project CG 680 - Corrosion Testing Facilities Bldg. 314

The Project Proposal for this work is still awaiting approval by the Washington office of the Commission. Authorization will be from the 1957 budget. Total funds \$140,000.

Project CG-676 - Fuel Element Semi-Works

Design work was 100% complete on August 17, 1956.

The bid package covering construction to be performed by a lump sum contractor was transmitted to the Commission on August 20, 1956. Bids will be received and construction started by October 1, 1956. General Electric has requested the Commission to establish 120 days as the total construction time. This may give us a beneficial use date of February 1, 1957. Total funds \$400,000.

Project CA 546 - Fuel Element Pilot Plant

The Project Completion notice for this Project was issued during August. Clean up items totaling \$2500. are being performed on work orders to Plant Forces. Total funds \$1,600,000.

Project CG 620 - Vacuum Melting Furnace

The three manufacturers who have submitted proposals for the equipment on this Project were visited during August. Revisions to some details of our specifications may be made as a result of this consultation. The equipment is also being relocated into the central area of the 314 Building with a future move to the 306 Building contemplated.

These changes will require a revision to the Project Proposal with no change in funds but an extension of the completion date.

Total Funds \$143,000.

Project CG 664 - 350° C Flow Loop

Design work on this project was estimated to be 90% complete at the end of August. A request for bid proposals for a "package" unit is scheduled for issue in September.

Total Funds \$120,000.

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PHYSICS RESEARCH SUB-SECTION

REACTOR LATTICE PHYSICS

Lattice Testing Reactor

Detailed investigations into the validity of k_{∞} measurements in the LTR were in progress this month. These studies were made on an 11-1/4 inch lattice. Measurements of the neutron flux distribution were made parallel to the axes of the fuel rods. For this lattice, it was not possible to get a flat flux distribution. By varying the length of the buffer region on the ends of the test core it was possible to get either a maximum or a minimum in the flux in the center of the test region. Measurements will be made of k_{∞} under these quite different conditions to determine the dependence of k_{∞} measurements on the longitudinal buckling in the test region.

Enriched Uranium Graphite Lattices

The investigation of possible E-N loadings for tritium production has been continued. Bucklings have been determined in the small (~ 4 ft. x 4 ft.) graphite exponential piles for several ratios of N material to E material to determine the most favorable, or practical, ratio for possible loadings in the Hanford reactors. Six inch, 1.34-inch diameter uranium fuel elements enriched to 0.94 per cent by weight U-235, and 0.909 inch, 1.34-inch diameter Li-Al (3.5 per cent by weight Li) target pieces were alternately positioned in the process tube assemblies. The ratio of N material to E material was varied by varying the number of Li-Al pieces in each tube. Measurements have been made with both three and six target pieces per tube. The target pieces were placed between the fuel slugs when six target pieces were used and following every other slug when the tubes contained only three target pieces. Measurements were made both with and without water in the process tubes. The results of the measurements completed to date are given in the table below.

<u>Lattice</u>	<u>Number of Fuel Elements Per Process Tube</u>	<u>Number of Target Pieces Per Process Tube</u>	<u>Process Tube Condition</u>	<u>Buckling (10^{-6} cm^{-2})</u>
8-3/8"	8	0	Wet	301
*8-3/8"	8	0	Dry	320
8-3/8"	7	3	Wet	142
8-3/8"	7	3	Dry	176
8-3/8"	7	6	Dry	10
6-3/16"	8	0	Wet	308
*6-3/16"	8	0	Dry	286
6-3/16"	7	3	Wet	109
6-3/16"	7	3	Dry	84
6-3/16"	7	6	Wet	-71
6-3/16"	7	6	Dry	-75

*These measurements were reported in the July report.

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High Temperature Exponential Experiment

A buckling measurement has been taken of the 7-1/2 inch lattice at room temperature with natural uranium 1.36 inch diameter slugs. The pile was covered with aluminum foil and the heating elements were in place. The buckling value measured was 98.77 microbucks. This is in good agreement with the value measured without the heating elements and foil (101.07 microbucks).

The 85 per cent magnesia insulation has been stacked around the pile and the electrical wiring is now being installed.

Enriched Uranium Water Moderated Lattices

The Exponential Pile Laboratory has continued the program of measuring lattices of enriched uranium in ordinary water. Four buckling measurements with hollow uranium slugs (1.66" O.D., 0.94" I.D.) were completed in August. The uranium was enriched to 1.007 per cent by weight U-235. A total of 85 tubes (eleven 4-inch slugs per tube) were used in the lattice assembly. The slugs were positioned in Type 2-S aluminum tubes which have an outside diameter of 1.73 inches and a wall thickness of 28 mils. An aluminum thimble of 0.926 inch O.D. and a wall thickness of 32 mils was placed within the inside hole of each fuel rod and measurements were made both with and without water in the thimble. The results of the measurements completed in August are given in the table below.

<u>Lattice Spacing</u> (hexagonal geometry)	<u>Center Tube</u> <u>Condition</u>	<u>H₂O/U</u> (by volume)	<u>Reflector Savings</u> (Assumed)*	<u>Buckling</u> (10 ⁻⁶ cm ⁻²)
2.05"	Wet	1.272	7.66 cm	2130
2.05"	Dry	0.873	8.25 cm	1430
2.20"	Wet	1.648	7.34 cm	2920
2.20"	Dry	1.248	7.67 cm	2380

*The reflector savings was taken from Brookhaven data on water-moderated uranium lattices.

Lattice Calculations

In connection with the present IPR studies, lattice parameters have been calculated for two natural uranium cored fuel elements (1.70" O.D., 0.75" I.D. and 1.66" O.D., 0.81" I.D.) in a series of graphite lattices with air, light water, heavy water, and diphenyl as the reactor coolant. The eight inch fuel elements were clad with 50 mil 2S aluminum. The thickness of the aluminum end caps was 0.345 inches and the aluminum base was 0.180 inch thick. Calculations were made with coolant annuli of three different thicknesses: 100 mil, 120 mil, and 150 mil. The process tube material was 60 mil zirconium and the graphite density was 1.65 g/cm³. It was assumed that neutron-economy-wise, diphenyl is similar to light water at a reduced density of 0.57 g/cm³.

The P₃ approximation to the transport equation was utilized to determine the thermal disadvantage factor of the fuel elements. The disadvantage factor for

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the 1.70" O.D., 0.75" I.D. fuel elements is 1.253 and that for the 1.66" O.D., 0.81" I.D. fuel element is 1.217. The material bucklings resulting from these calculations are given in the table below.

Material Buckling Values x 10⁶ cm²

Lattice	1.66" O.D., 0.81" I.D. Fuel Elements				1.70" O.D., 0.75" I.D. Fuel Elements			
	Air	H ₂ O	D ₂ O	Diphenyl	Air	H ₂ O	D ₂ O	Diphenyl
<u>100 mil coolant</u>								
4"	-1225.1	-479.6	-1052.2	-805.3	-1408.7	-555.9	-1210.5	-592.8
5"	-458.2	-178.5	-385.6	-246.7	-540.0	-221.8	-459.5	-298.1
6"	-127.6	-21.6	-91.1	-49.4	-169.3	-44.6	-129.0	-77.8
7"	27.6	52.8	46.2	49.5	7.1	42.9	27.9	36.0
8"	96.0	79.2	104.4	90.4	88.1	77.7	97.9	86.5
9"	117.7	78.0	119.8	97.6	117.8	81.9	120.7	100.0
10"	113.4	61.4	111.6	85.5	118.6	68.8	117.2	92.0
11"	95.0	37.0	90.7	63.2	103.4	46.4	99.3	72.2
12"	69.5	9.3	63.7	36.0	79.7	19.6	74.0	46.4
<u>120 mil coolant</u>								
4"	-1230.4	-411.2	-1030.9	-537.3	-1414.8	-479.0	-1186.2	-615.5
5"	-462.3	-149.7	-378.5	-220.8	-544.4	-188.2	-451.4	-268.2
6"	-130.4	-13.0	-88.6	-41.2	-172.4	-33.2	-126.1	-67.7
7"	26.0	51.1	46.9	49.9	5.2	42.8	28.7	37.3
8"	95.3	72.1	104.3	87.1	87.3	71.6	97.8	83.8
9"	117.6	68.2	119.2	92.4	117.6	72.7	120.2	95.2
10"	113.8	50.5	110.9	79.6	119.0	58.1	115.5	86.3
11"	95.7	25.7	89.9	57.0	104.1	35.1	98.5	66.0
12"	70.3	-2.0	62.8	29.8	80.6	8.4	73.1	40.2
<u>150 mil coolant</u>								
4"	-1238.1	-329.4	-1000.0	-451.8	-1423.7	-386.8	-1150.9	-518.8
5"	-468.3	-115.3	-367.7	-186.7	-550.9	-147.8	-439.9	-228.6
6"	-134.6	-4.2	-84.7	-30.5	-177.0	-20.8	-121.7	-54.2
7"	23.6	46.4	48.0	49.8	2.5	40.3	30.1	38.8
8"	94.3	60.4	104.1	81.8	86.0	61.2	97.8	79.4
9"	117.5	53.0	118.5	84.7	117.4	58.3	119.5	87.9
10"	114.4	33.8	109.9	70.7	119.4	41.8	115.5	77.6
11"	96.7	8.7	88.8	47.8	105.0	18.3	97.3	56.9
12"	71.6	-18.6	61.7	20.6	81.8	-8.3	71.9	31.0

Effects of Stainless Steel Can on Reactivity

A calculation has been carried out to determine the effect on pile reactivity by replacing the 40 mil aluminum cladding on fuel elements with 7 mil stainless steel. The calculation was carried out with a 1.36 inch diameter natural uranium fuel element in a series of graphite lattices with light water as the coolant. The 76 mil thick coolant annulus contained 2.33 cm³ of water per centimeter length of fuel element and the process tube material was 60 mil aluminum. The density of the graphite moderator was 1.65 g/cm³. The results of the calculation are given in the table below.

<u>Buckling x 10⁶ cm²</u>			
<u>Lattice</u>	<u>Aluminum Cladding</u>	<u>Stainless Steel Cladding</u>	<u>Difference</u>
6-3/16"	32.3	-9.5	41.8
7"	72.7	36.7	36.0
7-1/2"	83.0	49.0	34.0
8"	85.4	53.0	32.4
8-3/8"	83.2	51.8	31.4

The reactivity loss in a pile due to the replacement of aluminum cladding with 7 mil stainless steel is approximately 900 inhours.

Temperature Coefficient Measurement in the Lattice Testing Reactor

An examination is being made of the vibration spectrum of graphite to determine the suitability of the Debye model in phonon-neutron interaction problems. These problems are of interest in connection with the LTR oven where it is desirable to know the thickness of moderator required to bring neutrons of one temperature into equilibrium with the moderator at a different temperature.

EXPERIMENTAL NUCLEAR PHYSICSPu-240 Fission Cross Section

The automatic data taking and recording system, recently installed on the neutron spectrometer has been utilized to greatly improve the statistical precision and density of points in low counting rate fission cross-section measurements. In particular, the existence of a small plutonium fission resonance, presumably in Pu-240, at about 1.05 ev has been definitely established through the use of this instrumentation. Foils of a high concentration of higher plutonium isotopes have been received from the Chemistry Research Sub-Section and fission measurements designed to improve the knowledge of the Pu-241 fission cross section are commencing.

Instrumentation

A scintillation gamma ray counter was assembled for routine counting of foils irradiated in the LTR. Gamma ray counting is superior to beta particle counting of foils which have significant neutron resonance activation. The counter developed was stable to better than 0.1 per cent in counting rate for periods of one hour. The gain may be adjusted when drifts become significant to give a long

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term stability of the same order.

The procedure for counting and gain adjustment is suitable for technician operation.

Work continued on a noble gas scintillation counter. The objective of this work is to study the scintillation properties of liquid gases, especially xenon. Alpha particle induced scintillations were observed in argon gas. In connection with this project, an evaporator was built for applying a wave-length shifter to the walls of the test cell.

EXPERIMENTAL REACTOR OPERATIONS

Lattice Testing Reactor

Operation of the Lattice Testing Reactor continued routinely during the month. Four unscheduled "scrams" occurred; all were caused by faulty operating technique. Reactivity measurements were made on dry 7-1/2", 8-3/8", and 11-1/4" lattices using H-Pile tubes and, for Physics Development, a dry 7-1/2" lattice with 2-1/8" tube holes was tested.

A three-day maintenance shutdown took place during which the following installations and repairs were completed:

1. An improved alarm circuit was installed and tested.
2. The movable face power was run through the safety circuit so the face will remain in position at night.
3. The faulty safety circuit power switch was replaced.
4. Improved "Vertical Safety Disc Up" limit switch assemblies were installed.
5. The magnet for Safety Disc "C" was replaced with one with copper plating along its poles.
6. The source-sealer interlock, which automatically turns on the low-level scaler when the source is in, was installed and tested.
7. All electron tubes in the safety instruments were checked.
8. New mercury-cell batteries were installed in the trip circuits and in the period amplifiers.
9. The slidewire and switches in the potentiometer were cleaned.
10. Channel-2 count-rate-meter was recalibrated.
11. A short to ground in the safety and interlock circuit was located and corrected.
12. The ground detector circuit was overhauled and tested.

13. New graphite storage bins were installed.

Graphite for new cores was machined; cores are now available with spacings from 5-5/8 inches to 11-1/4 inches in steps of approximately 1 inch.

Thermal Test Reactor

Installation and testing of all mechanical, electrical, and electronic components for the Thermal Test Reactor were completed. A neutron source was placed in the center of the pile and loading was performed as specified in the Start-Up Procedure. The reactor first went supercritical with the source still in the pile at 10:52 A.M., August 15, with a period of about 4-1/2 minutes; the critical mass was approximately 2783 grams. The first true period (source out of the pile) was taken at 1:02 P.M., August 16; the measured value was 68 seconds.

The fuel elements are each presently covered with a thin coating of paraffin. However, formation of gas bubbles due to the interaction of the metal with the water moderator is still occurring. The formation and release of these bubbles affect the reactivity of the core and are at present interfering with calibration of the reactor safety sheets, safety sheets, and control rods. Methods are being investigated to prevent this bubble trouble.

Four unscheduled "scrams" occurred. Twice the Phototube High Level Trip was exceeded; the other two shutdowns were caused by instrument failure (Channel 3) and by premature opening of the reactor room doors.

Maintenance was of a minor nature. Channel 1 Brown Recorder and Channel 3 Amplifier were overhauled and a winding of Control Rod No. 2 Motor was replaced.

A Polonium-Beryllium source with a strength of 10^7 neutrons per second has been ordered for the TTR.

Criticality Experiment

Fuel procurement and construction of mechanical components for the criticality experiment continued.

NUCLEAR SAFETY PROBLEMS

A review of the 234-5 Building process is being made to find methods of increasing capacity by revision of nuclear safety limits.

Nuclear safety limits for α -plutonium metal have been specified.

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METALLURGY RESEARCH SUB-SECTION

Fundamental Studies

As a guide for the interpretation of the microstructure of irradiated uranium, the normal mode and mechanism of deformation and fracture in non-irradiated, polycrystalline uranium is being studied. Microscopic tests on the tensile and compressive yielding of uranium at elevated temperatures are now in progress. Techniques for replicating fracture surfaces by remote manipulation, a necessity for radioactive specimens, are being developed, and being applied to impact fractured specimens of non-irradiated uranium to permit standardized optical and electron microscope examination. Since the brittle properties of irradiated uranium may develop as a consequence of fission product build-up at grain boundaries, examination of the fracture surfaces obtained at low temperatures, room temperature, and elevated temperatures should provide a simple method for detecting possible irradiation effects. It has been found that fracture surfaces of non-irradiated uranium produced by impact at a temperature of -185°C and -800°C are predominately brittle in nature, and show large facets and microcracks. X-ray back reflection Laue patterns of the fracture facets indicate that appreciable plastic deformation does occur at these low temperatures.

Measurement of the diffusion of noble gases in silver has continued; three of five sets of xenon samples were analyzed successfully. The other two were lost at the pile. The following diffusion coefficients were obtained for xenon in silver at three temperatures.

$$D_{600} = 6.5 \times 10^{-11} \text{ cm}^2/\text{sec}, D_{700} = 2.9 \times 10^{-9}, D_{800} = 1.02 \times 10^{-8}$$

The activation energy appears to be about 37 kilocalories per gram atom.

The study of the effects of reactor irradiation on the microstructure of reactor materials can be evaluated by a combination of high resolution metallography and x-ray diffraction analysis. X-ray diffraction analysis of annealed and 50 per cent cold worked Zircaloy-2 has shown the extent of "finish" polishing necessary to remove surface cold work. It was found that after lapping the specimens flat, it was necessary to repeat a polish on 4-0 paper followed by a "B" etch three times to remove the worked metal due to lapping.

The ex-reactor diffusion of U/AlSi and U/Zirconium is being investigated to provide a basis for interpreting in-reactor studies currently in progress. One U/AlSi couple was annealed for 15 days and two for 30 days at 200°C (392°F) and one was annealed 15 days at 305°C (581°F). One of the 30-day couples that were annealed at 200°C failed to diffuse. X-ray analysis showed that the diffusion interface had been contaminated with a molybdenum compound. The data from these couples is being statistically analyzed to determine the maximum rates of diffusion. Examination of several U/AlSi couples showed that at some points slight preferential diffusion had occurred at grain boundaries, but that the over-all diffusion was not grain boundary dependent.

Experimental work on the U-Al diffusion couple irradiated to 0.02% burn-up in MTR has been finished with the positive identification of UAl_3 at the interface. The extent of penetration could not be quantitatively established with present remote equipment, but qualitative observations suggested greater diffusion than would have occurred at a similar average temperature outside the reactor.

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Work has been completed on the experiment to evaluate the amount of residual cold work in metallographic specimens at various stages of preparation. Using the width of 154 alpha, x-ray lines as a measure of cold work and taking the annealed condition as standard, it is evident that considerable work exists in samples prepared by existing remote techniques. Its effect on x-ray line width seems to be more acute than its influence on micrographic appearance. Other factors such as operator variables, type of illumination, etc. obscure much of the variation in micro-appearance. Inasmuch as the irradiated samples showed large and seemingly random variations in line width from point to point over the surface, the effects of irradiation on work-hardenability during sample preparation could not be conducted with the equipment used on the unirradiated samples.

Mechanical and Physical Properties of Fissionable Materials

Burn-up measurements were completed by the Radiochemistry Unit for samples from three uranium tensile specimens exposed in the MTR at high gamma phase temperatures. These analyses confirmed the high flux values reported by the MTR. A similar capsule was returned from the MTR after one cycle exposure in an experiment to obtain tensile properties of material exposed at beta or gamma phase temperature. Samples were cut from tension specimens exposed to approximately 150, 300, and 600 MWD/T at HAP0 to determine burn-up. One determination was completed and indicated that the exposure was 0.075 per cent burn-up (645 MWD/T). The activity of Al-Co flux monitors included in this production test were determined. These results indicate the variation in exposure due to sample position along the tube and to control rod effects.

Reactor Structural Materials

Study of sorption of hydrogen by zirconium under various exposure conditions has continued. Zirconium, Zircaloy-2, and Zircaloy-3 pick up a portion of the hydrogen released when they react with water or steam according to the formula:



As the amount of hydrogen sorbed by the zirconium approaches 100 per cent of that released by corrosion of the zirconium, hydrogen embrittlement replaces corrosion as a factor limiting the life of a process tube or slug can. If 500 ppm is taken as sufficient to cause failure of zirconium in service, the life of a 0.1-inch thick piece of zirconium exposed to steam on one side is as follows providing 100 per cent of the hydrogen released by oxidation of the zirconium is sorbed: (a) Zirconium at 720 C, 100 hours; at 400 C to 600 C, 500 hours; (b) Zircaloy-2 at 720 C, 14 hours; at 600 C, 60 hours; at 500 C, 800 hours, and at 400 C, indefinite but greater than several thousand hours; and (c) Zircaloy-3A at 720 C, 23 hours; at 600 C, 500 hours, and at 400 to 500 C several thousand hours. As a result of about 50 exposures of these three zirconium alloys to steam under various environmental conditions the following generalizations are made:

- (1) The fraction of hydrogen released by corrosion of the zirconium that is picked up by the metal varies with slight changes in test conditions, and it may be as high as 100 per cent under conditions of cyclic heating.

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- (2) The presence of hydrogen in steam above 400 C reduces the oxidation rate and sometimes reduces the rate of hydrogen sorption. If, however, hydrogen is produced by reaction of another metal with steam or water and the gas is not swept away by steam or water circulation, zirconium may soak up several hundred per cent of the hydrogen released by zirconium corrosion or by other reactions.
- (3) Metallurgical bonding of the zirconium with aluminum or uranium appears to have little effect on the rate of hydrogen sorption from steam or water. Aluminum or any other metal may accelerate hydrogen sorption by acting as a container that confines hydrogen produced in the reaction zone.

During testing at 100 H of the F series Dewcel, an instrument used to determine the relative humidity of pile gases, thirteen instrument failures occurred. Visual examination indicated that the failure was due to corrosion. Two failures were sent to the Corrosion Laboratory for further examination in order to determine the cause of failure. The Dewcel instrument consists of a silver wire wound around a plastic core, mounted in a 300 series stainless steel coupling. The entire coil and part of the coupling is dipped in a solution of lithium chloride and then allowed to dry. A potential of about 25 volts is applied across the coil, and relative humidity is measured by the change in conductivity of the lithium chloride film with changing water content. Both of the failures examined exhibited corrosion on only one of the silver terminals, and pitting of the stainless steel coupling about this same terminal. Spectrographic analysis of the corrosion product indicated that it was composed of corrosion product from the silver wire, the soldered connection, and the stainless coupling. Resistance measurements were made between the silver coil and the stainless coupling, which should be completely insulated from each other, showed that a small current was flowing between the coil and the coupling when the instrument was in operation and this current was of sufficient magnitude to account for the corrosion observed. This would also account for the heterogeneity of the corrosion product. The above information is being forwarded to the manufacturer.

Fuel Materials

Uranium shot of a fairly uniform particle size that tap packs to a density of 62% of uranium metal has been compacted at 50 tsi to about 76% of uranium density. The feasibility of preparing high density U-Mg fuel material with compacted shot is being investigated further.

Installation of equipment in the ceramic laboratory continued. Program controllers were received for controlling the rate of heating, soaking time, and rate of coolings in the hydrogen sintering furnaces. Procurement of additional equipment and supplies was initiated to meet future increased requirement of UO₂ elements for the plutonium recycle reactor program. A belt centerless grinder appears promising for precision grinding of ceramic rods and is being actively considered.

A plastic die nozzle for the extrusion press was cast from "Scotchcast", an epoxy resin. It is hoped that this technique will help to establish optimum extrusion die design for non-symmetrical shapes at minimum cost and time.

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Preparation of patterns and plaster molds was completed for initial experiments in slip-casting UO_2 .

Fuel Element Evaluation

Metallographic examination was completed on a wafer sectioned from a cored AlSi bonded slug which had been exposed to 700 MWD/T under MTR irradiation GEH-4-1. Previous scintillation scanning results had shown that the concentration of fission products at one edge of this slug was 50 per cent greater than that found at the opposite edge. The degree of flux asymmetry observed in this cored slug is greater than that observed in Hanford irradiated material. Results of the metallographic study showed that no abnormal heating was associated with the non-symmetrical fission product distribution.

A method of using a step by step viscoelastic solution is being formulated, which would avoid the numerical stability problems associated directly with numerical integration of a time dependent solution for the thermal stresses in fuel elements. The viscosity coefficient used in the viscoelastic model is assumed to be time and radially dependent and changes with each step. Further work on iteration procedure and starting method of this solution must be done before the method can be applied to a numerical example.

The investigation of the methods used in irreversible thermodynamics for the analysis of creep and relaxation tests should not apply to the analysis of experimental data obtained at high stresses where creep rate is exponentially dependent on stress. The use of these methods should be applied at low stresses and then extensions into the non-linear dependent regions may be suggested from this study.

Further research on the application of thermodynamic methods to the formulation of material models will be done in the future. A use of dissipational potentials in variational formulations of material laws may also bring forth new methods of solving the general equations of plasticity when strain rate, strain, temperature and stress dependent material models are used.

The HAP0 size enriched U-Mg matrix slug at the MTR is expected to be reloaded at the next scheduled shutdown for its irradiation through one MTR cycle. Following this one cycle exposure (at 117 kw/ft, 600 C maximum temperature) the HAP0 PT loading of matrix slugs will be charged.

Experimental zirconium clad fuel elements will be charged in the KER high temperature loop after preliminary work with stainless steel clad elements. To evaluate the effect of zirconium cladding on the rupture of a uranium fuel element in high temperature water, a fuel element was electrically heated and ruptured in the Metallurgy Research high temperature loop. The zirconium did not absorb hydrogen from the uranium-water reaction at 300 C water temperature. Voluminous hydride was formed between the uranium fuel and the unbonded cladding. Volume expansion was about 200 %.

Thin walled tubing is desired for cladding reactor fuel elements with stainless steel, a strong thermal neutron absorber. Stainless steel type 304-L with .007 inch wall was welded to two different types of end caps for closure. Both welds were successful. Work is under way to combine successful welds with an end cap suitable for cluster fuel elements.

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Metallurgy Research Sub-Section

KER mockup fuel elements of two designs were dropped from K reactor into the basin. The internal ring mounted cluster fuel element suffered no damage, and should remain in one piece after normal operation and discharge. The external ring mounted and spot welded cluster fuel elements parted at the welds and the design has been changed to prevent this.

Radiometallurgy Examination

The examination of six unruptured, standard production slugs to determine the relation between core distortion and bonding in "normal" slugs and "incipient cap failures" (i.e. slugs exhibiting "necked down" regions in the jacket immediately below the cap) continued. The final two slugs examined were both "necked down" at the cap ends. Both slugs were sectioned longitudinally at the base and cap ends. Length and dish measurements obtained from these sections are summarized:

Length and Dish Measurements

Slug End Data	Tube	Exposure, MWD/T	<u>Dish, mils</u>		<u>Average Length Change, Mils</u>	
			<u>Cap</u>	<u>Base</u>	<u>Axis</u>	<u>Periphery</u>
H-3360 (E)	2390-H	849	8	19	--	--
H-3360 (F)	2390-H	849	5	20	-142	-117

The caps of both slugs were found to be unbonded to the core whereas the bond at the base ends appeared to be in good condition. The jacket appeared to be well-bonded at both ends of the two slugs, with one notable exception: the jacket at the cap end of slug No. E was completely unbonded for a distance of at least one inch below the cap as evidenced by its easy removal during a decapping operation of one of the longitudinal sections. The uranium diameters at the extreme ends of both slugs were found to have decreased from 20 to 30 mils, while increases from 0 to 16 mils were found 3/4 inch from each end. These changes are based on the specified pre-irradiation diameter of 1.336 inch. The following observations have been drawn from a preliminary examination of the data obtained from this investigation:

- (1) "Necking" of the jacket appears to result from pronounced decreases in diameter at the extreme ends of the core, rather than from increases in core length.
- (2) Dishing at one or both ends of the core appears to be normal and cannot be associated with cap failures. Dishing at the base end generally exceeds that at the cap end by a factor of two.
- (3) Slug cores undergo decreases in length and increases in diameter (except at the extreme ends) during irradiation.
- (4) The bond between the cap and core is generally found to be broken after irradiation, while the bond between the base and core is more often found to be intact.

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Metallurgy Research Sub-Section

The examination of the first of three split-type failures from the KW Reactor is nearly complete. This piece failed in tube 3585-KW on April 29, 1956 after an exposure of 595 MWD/T. It came from material cast, rolled, and heat-treated at Fernald; however, further information concerning its fabrication history cannot be obtained because the data stamped on the end of the core was destroyed by corrosion. Metallographic examination of a wafer taken from the center of the slug has revealed two very large stringers of slag inclusions. These stringers are in the shape of wide, thin plates which are parallel to the longitudinal axis of the slug and extend completely through the 1/2-inch thick wafer. Surrounding each stringer for a very short distance (10 mils) is an extremely fine-grained structure (estimated to be as fine or finer than alpha-rolled material). A large number of intergranular micro-cracks were observed in the fine-grained material; however, very few of these cracks extended into the normal large-grained areas surrounding the fine-grained areas. It appears quite likely that a stringer of slag inclusions lying in the plane of the fracture was responsible for the failure of this slug. The unusual fine-grained and apparently brittle structure surrounding the inclusions previously described was not observed along the edge of the fracture; however, this is not surprising because the rapid corrosion undergone by the fracture surfaces of the uranium core following failure would certainly destroy such a narrow band of material.

Three sections of ANM-388 alloy can wall from a slug discharged from the H-loop have been removed and examined metallographically. One of the pieces of can wall was cut to bisect a crater that was present on the surface of the slug. Macro flow lines following the crater indicate that it was caused by mechanical damage. No evidence of intergranular corrosion has been found in this can wall. The examination of this slug has been completed and will be reported.

Four assemblies containing nickel and nickel-iron diffusion bonded tensile specimens were received after irradiation of 1485 MWD/T according to Production Test 105-537. The average ultimate strength of these samples, which were irradiated at a temperature of 200 C, was approximately 17% below the pre-irradiation value of 9,000-11,000 psi.

Separations Plant Structural Materials

The examination of the coupons that were exposed to the Hot Semi-Works self-concentrator waste storage tank for one year is continuing. The examination of the unstressed coupons is completed. Generally the coupons that were in the gas phase have pits that are 10 times deeper than those found in the liquid phase coupons. The 1020 carbon steel coupons have less pit penetration than the other unstressed steel coupons. The liquid phase, unstressed 1020 carbon steel coupons had $15-30 \times 10^{-6}$ inches per month pit penetration and the gas phase ones had $150-200 \times 10^{-6}$ inches per month pit penetration. The remaining unstressed steel coupons, Mayari-R, Cor-Ten, and weld metal have a pit penetration of $30-60 \times 10^{-6}$ inches per month for the liquid phase coupons and $200-400 \times 10^{-6}$ inches per month for the gas phase coupons. The examination of the stressed coupons is underway.

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Metallurgy Research Sub-Section

Plutonium Metallurgy

Plutonium parts for four Pit 65 assemblies have been completed and shipped. These parts complied with all dimensional and radiographic requirements. Four pins were heavier than specified by very small amounts because the exceptional purity of the plutonium used resulted in metal of superior density. Metal of lower density could be produced by adding impurities to the plutonium; it is not believed this would be desirable or within the spirit or intent of the specifications. All parts were vacuum canned for shipment to assure their arrival at the assembly point without oxidation.

Fourteen simulated 1000 MWD plutonium-uranium alloy fuel slugs for PCTR experiments have been completed through canning. Production of the remaining twenty-six slugs required for the first charge is proceeding.

Plutonium-aluminum alloy foils for use of Physics Research have been completed with the exception that some of the discs must still be flattened and dressed. Methods of coating these foils are being developed. A delta plutonium disc for the Pile Physics group will be rolled and cut just prior to canning to avoid the rapid oxidation of the unprotected foil. The electroforming of cans for this purpose is proceeding.

PILE TECHNOLOGY SECTION

INVENTIONS

All Pile Technology Section personnel engaged in work that might reasonably be expected to result in inventions or discoveries advise that, to the best of their knowledge and belief, no inventions or discoveries were made in the course of their work during August, 1956 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.

N O N E

P. H. Reinker

Acting Manager - Pile Technology

PH Reinker:cvf

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Visitors and Business Trips (continued)

A. T. Whatley, ANP, Idaho Falls, Idaho visited Hanford on 8/27 thru 8/28/56 to discuss iodine on stack problems.

W. D. Stump and F. Wall, Dow Chemical Company, Rocky Flats Plant, Boulder, Colo. visited Hanford on 8/27 thru 8/28/56 to discuss radiography and autoradiography procedures pertaining to material produced in 234-5; also discuss statistical treatment of analytical data on plutonium.

G. W. Watt, Consultant from University of Texas, Austin, Texas visited Hanford on 8/20 thru 8/24/56 to consult on plant processes sub-section problems.

N. D. Groves of Carpenter Steel Co., Reading, Penn. visited Hanford on 8/29/56 to discuss corrosion techniques.

S. H. Smiley, C. A. Powell, E. Bollinger, of the Union Carbide Nuclear Co., K-25 Plant visited Hanford on 8/29 and 8/30/56 to discuss continuous calciner process.

R. E. Smith of Hanford visited the Los Alamos Scientific Laboratory, Los Alamos on 8/13 and 8/14/56 to discuss plutonium chemistry and metallurgy and the Dow Chemical Company Rocky Flats Plant, Boulder, Colo. on 8/15 to discuss plutonium chemistry and metallurgy.

R. E. Larson and A. Lagani of Knolls Atomic Power Laboratory, Schenectady visited Hanford on 8-22-56 to discuss covering spectrographic analysis of KAPL-120 water samples.

A. J. Zeits of Hanford visited the Aircraft Nuclear Propulsion Dept. Cincinnati, Ohio on 8/27 and 8/28/56 to discuss mutual analytical problems.

K. M. Harmon of Hanford visited the Dow Chemical Company Rocky Flats Plant, Boulder, Colo. on 8/13 thru 8/14/56 to discuss plutonium chemistry and metallurgy and the Los Alamos Scientific Laboratory, Los Alamos on 8/15/56 to discuss plutonium chemistry and metallurgy.

F. A. Scott of Hanford visited New Hampton, New Hampshire on 8/4 thru 8/11/56 to attend the Gordon Research Conference.

A. S. Wilson of Hanford visited New Hampton, New Hampshire on 8/11 thru 8/17/56 to attend the Gordon Research Conference.

J. H. Kleinpeter attended the Maintenance and Protective Coatings School at North Dakota State College, Fargo, North Dakota on 8/1 thru 8/4/56.

ORGANIZATION AND PERSONNEL

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Separations Technology Section	2	2
Plant Processes Sub-Section	65	67
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DECLASSIFIEDVISITORS AND BUSINESS TRIPS

L. A. Ferris, W. K. Eister, R. J. McNamee and C. W. Hancher of Oak Ridge National Laboratory, visited Hanford on 8-20 thru 8-23-56 to discuss solvent extraction and U processing and to attend the UO_3 Conference.

N. Levitz of Argonne National Laboratory, Lemont, Illinois visited Hanford on 8-22 thru 8-24-56 to attend the UO_3 Conference.

W. R. Rossmassler of Union Carbide Nuclear Co., Oak Ridge, Tenn. visited Hanford on 8-22 thru 8-23-56 to attend the UO_3 Conference.

E. S. Roszkowski of AEC-NBL, visited Hanford on 8-22 thru 8-23-56 to attend the UO_3 Conference.

R. D. Thorne, AEC-SROO visited Hanford on 8-22 thru 8-23-56 to attend the UO_3 Conference.

R. E. Leed, AEC-OROO, visited Hanford on 8-22 thru 8-23-56 to attend the UO_3 Conference.

R. V. Anderson, AEC-Fernald visited Hanford on 8-22 thru 8-23-56 to attend the UO_3 Conference.

W. N. Munster, AEC, Product Division, Washington, D. C. visited Hanford on 8-22 thru 8-23-56 to attend the UO_3 Conference.

B. Schwarz, AEC, Feed Materials, Washington, D. C. visited Hanford on 8-22 thru 8-23-56 to attend the UO_3 Conference.

W. W. Harris and E. J. Barber, Union Carbide Nuclear Co., K-25 Plant, Oak Ridge, Tenn. visited Hanford on 8-22 thru 8-23-56 to attend the UO_3 Conference.

W. C. Nanser and P. S. Gentile of National Lead of Ohio, Fernald, Ohio visited Hanford on 8-21 thru 8-23-56 to attend the UO_3 Conference.

R. M. Edwards and A. E. Ruehle of Mallinckrodt Chemical Works, St. Louis, Missouri visited Hanford on 8-22 thru 8-23-56 to attend the UO_3 Conference.

D. A. Vaughn of Battelle Memorial Institute, Columbus, Ohio visited Hanford on 8-22 thru 8-23-56 to attend the UO_3 Conference.

E. T. Cook of Savannah River Project duPont, Aiken, So. Carolina visited Hanford on 8-22 thru 8-23-56 to attend the UO_3 Conference.

A. G. Allison, of Battelle Memorial Institute visited Hanford on 8-22 thru 8-23-56 to attend the UO_3 Conference.

L. W. Powers, G.E. West Lynn, Mass. visited Hanford on 8-21-56 to consult on a mass spectrometer.

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Plant Processes Sub-Section: K. V. Seyfrit, Engineer II transferred into the Sub-Section from Manufacturing on 8/1/56. N. A. Taylor, Steno-Typist transferred into the Sub-Section on 8/27/56 from the Stenographic Unit. R. N. Nelsen, Engineer II transferred to GE, Fort Wayne, Indiana on 8/2/56.

Chemical Development Sub-Section: B. E. Lauer, Senior Engineer (Summer Employee) terminated on 8/22/56. Erma M. Chacon, Gen. Clerk "C" transferred from the Sub-Section to Salary Control Records Unit on 8/13/56.

Chemical Research Sub-Section: J. E. Cassidy, Engineer I (Summer Employee) terminated on 8/24/56. D. G. Miller, Engineer I, terminated on 8/24/56. W. P. Van Meter, Engineer I terminated on 8/31/56.

Analytical Laboratory Unit: Martha H. Buckner, Lab. Asst. C transferred into the Unit from Education and Training on 8/13/56. F. E. Holt, Supervisor, Analytical Technology transferred into the Unit on 8/13/56. Jack L. Humason, Engineering Assistant transferred into the Unit on 8/9/56. Carol T. Arneson, Lab. Asst. D was deactivated on 8/30/56.

Technical Shops Unit: S. C. Gettings, Draftsman I terminated from the Unit on 8/10/56. C. E. Zook, Drafting Trainee terminated from the Unit on 8/3/56.

DECLASSIFIEDPLANT PROCESSES SUB-SECTION, O. F. HILLREDOX PROCESS TECHNOLOGYSummary

Unstable operation in the extraction battery resulted in a large loss of plutonium to the salt waste during the processing of dissolver heel solutions and equipment flushes of the dissolver and feed preparation cells. This loss, combined with an unusually large plutonium pickup from the cell sumps, was held for rework. The HA, HS, HC, IA, and 2A Columns plus the 2AF feed tanks (E-5, E-6, E-7) and the IAFS concentrator tanks (F-1 and F-2) were flushed with hot (60 to 70 C) 60 per cent nitric acid. These acid flushes, when combined and sampled, showed a plutonium pickup approximately equivalent to one full head-end batch of virgin feed. Consequently, most of the month's operation involved processing virgin feed blended with either salt waste or neutralized acid waste. The processing of this material was generally smooth, although waste losses were five to ten times normal (averaging about 1.5 per cent), and a tendency for unstable operation in the extraction columns owing to the buildup of crud made the decontamination performance sensitive to operational variables.

The plutonium pickup by the acid flushes is postulated to have occurred as a result of either (1) plutonium(IV) oxalate pickup from last month's storage of plutonium solutions containing hexone or (2) formation of plutonium(IV) polymer.

The average exposure of the metal charged to the dissolvers was 760 (842 to 599) MWD/T, and its average cooling time was 130 (106 to 148) days. Control of iodine-131 emission to the environs was excellent.

On August 23, 1956, the extraction battery was again shut down for conversion from high MWD/T material to low MWD/T material.

Feed Preparation

The majority of the feed batches processed during the month were blends of virgin metal solution and varying amounts of either salt waste, acid wastes, or sump solution resulting from the leak in the IAFS concentrator. The salt waste was blended with the virgin metal solution in a volume ratio of 1.0 to 1.2, while the acid waste was blended in a ratio of one to six or one to three (waste to metal solution). All waste rework batches received 0.03 - 0.02 molar permanganate oxidation treatments. Centrifuge bowl cleanouts were made every third head end run instead of every sixth run during the processing of the acid waste material to assure the best solids separation possible.

Decontamination

Uranium and plutonium decontamination was good considering the large amount of rework processed. Over-all fission product decontamination factors (logarithmic) averaged 6.9 and 7.9 for uranium and plutonium, respectively. All final uranium

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product batches, except five, met specifications for subsequent processing, and these five batches are being held for silica gel treatment and/or blending with subsequent uranium production. On August 17 and 18, plutonium decontamination was marginal due to flooding in the HA Column on August 15 and an operational upset of the HS Column on August 16. During the rest of the month, plutonium decontamination was above specifications.

Solvent Extraction

The over-all operation of the extraction battery was relatively uneventful during the extended period (August 11 to August 24) of rework processing. During the latter part of the rework period, all of the extraction columns were highly contaminated, and any unsteady operation resulted in increased radioactivity in subsequent process streams. The HA Column became inoperable due to flooding after 3.5 days of processing salt and acid waste rework feed solutions and, after water flushing, was still inoperable. The HS Column was therefore used in place of the HA Column and operated smoothly for the completion of the acid rework (no salt waste rework was processed through the HS Column).

Near the end of the rework period, the final uranium extraction column (2D) was upset due to instrument trouble which allowed highly contaminated interfacial material to overflow with the organic and contaminate five of the final uranium product stream batches to a level about twice the allowable radioactivity specifications for subsequent processing.

Waste Losses

The over-all recoveries for the month were 99.70 per cent and 98.57 per cent for uranium and plutonium, respectively. The poor plutonium recovery was due to two main causes, viz, (1) high solvent extraction losses while processing non-standard feed solutions and (2) the discarding of salt waste solutions which would normally have been reworked to make room in the rework system for nitric acid flush solutions with a much higher plutonium content than the preceding salt waste solution. The high solvent extraction losses (approximately 1.5 per cent of the feed plutonium) occurred during the processing of such non-standard feed batches as dissolver heel removal solutions, dissolver and feed preparation cell flush solutions, and process cell sump solutions.

In the early part of the month, the HA, HS, HC, IA, and 2A Columns, the 2AF feed tanks (E-5, E-6, and E-7), the IAFS concentrator (F-2), and the IAFS feed tank (F-1) were flushed with hot (60 to 70 C) 60 per cent nitric acid. These acid flushes picked up an amount of plutonium approximately equivalent to one full batch of virgin metal solution. Of this amount, approximately 59 per cent came from the HC Column, IAFS concentrator, and IAFS feed tank, 12 per cent from the HS Column, and about four per cent from the IA Column. The source of the remaining 25 per cent was uncertain but may have been the waste cell tanks. The plutonium was contained in two batches, each roughly 2300 gallons of 40 per cent nitric acid. The first batch of acid contained 90 per cent of the total plutonium, with the rest in the second batch. In an attempt to get the

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plutonium in a recoverable state, the nitric acid was neutralized with caustic to a final concentration of 1.5 molar, and the solution was made 0.05 molar in sodium dichromate and held at 80 C for 2.5 hours. This was then reworked via the head-end in 300 gallon batches.

The cause of the plutonium accumulation is not definitely known but is very possibly associated with the problem of plutonium precipitation encountered last month when hexone-saturated product solutions were held for a long period of time awaiting the rehabilitation of the final concentration building. The precipitates (as plutonium oxalate or plutonium polymer or both) which were dissolved, flushed from the plutonium cycle vessels, and returned to head-end for recovery, were probably metastable in solution and were slowly reprecipitated in the process of transfer and rework, thus tending to accumulate in the unagitated vessels.

The possibility also exists that the accumulation occurred gradually over a long period of operation due to the acid deficiency of the flowsheet but, based on chronological history and available data, this theory does not fit all known facts as well as the first postulation. An intensive study of the data and Redox operating history is under way, combined with additional laboratory work and plans for plant studies to determine exactly what the problem is and whether or not it is an inherent or a non-recurring one.

Waste Storage

Since the reactivation of the 101-SX air recirculator on June 15, 1956, no tank pressurizations have taken place.

The self-concentration rate of the 101-S and 104-S tanks (first tanks to self-concentrate) had fallen to approximately 0.014 gpm. Therefore, on August 17, the vapor lines were valved off and the tanks placed on total reflux, using the original air condensers.

PUREX PROCESS TECHNOLOGY

Summary

The Purex Plant operated at a capacity factor of 1.44 for the major part of the month. After flushing the plutonium stripper and concentrator to remove the siliceous scale, the plant was started on August 3 and operated for ten hours prior to a shutdown caused by a plugged line from the plutonium concentrator to receiver. The plutonium concentration equipment was again flushed and a considerable amount of organic material removed.

Operation has been continuous since August 9, except for two local electrical power outages of short duration. In addition, a process upset (excess sodium nitrite in the IAF) required recycling the feed to the final uranium cycle for 46 hours to recover the excess plutonium. Although the solvent extraction systems suffered these upsets, the plant was able to maintain specification

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product during the report period, except for three plutonium batches and eight tons of uranium. About 66 per cent of the uranium produced required treatment by silica gel to reduce the gamma ratio to 2.0 or less. The plutonium concentration equipment has been operating satisfactorily, and no buildup in the equipment has been detected. Although operation of the IO Column T-G2 has been very erratic, caused by frequent flooding, the solvent gamma activity has remained approximately normal. The final concentrated waste volume has been maintained at or less than flowsheet volume, and approximately 82 per cent of the acid to the waste cell has been recovered as 50 weight per cent acid. Underground storage tank 241-A-103 now contains about 331,000 gallons of waste and is self-concentrating at a rate estimated to be three to five gallons per minute. Usually three "bumps" are recorded per day with pressures of five to ten inches of water being generated in the tank.

Feed Preparation

Irradiated uranium slugs with an exposure of 3.2 to 6.7 MW/T (604 to 859 MWD/T) and cooling times from 111 to 268 days were dissolved in the two dissolvers. Radiiodine to the stack varied between 0.01 and 0.03 curies per day.

After additional acid and a lower end point specific gravity were incorporated into the dissolver procedures to compensate for the change in mol ratio reported last month (from 3.5 to 3.8 mol HNO_3 per mol U), subsequent data indicated no change existed in the mol ratio. A second modification, initiated to improve the capacity of the dissolvers, compensated for the previous flowsheet change. Currently, the metal charged to the dissolvers is 133 per cent of that originally charged, and the metal is dissolved in two cuts. Additional data are being assembled for evaluation of this procedure change.

Solvent Extraction

The Purex Plant started up on August 3 after the completion of the L cell package flushes for the removal of the siliceous scale. However, the plant was shut down after only ten hours of operation because the line between the plutonium concentrator and the plutonium product receiver became plugged.

After a second flushing of the L cell package, plant operation was restarted on August 9 at a nominal production rate of 1.44 capacity factor. Although the first two batches of plutonium exceeded the uranium specification and required processing at the 231 Building, the following batches met product specifications. After three days of operation, the uranium product gamma ratio had decreased from 19 for the initial batch following startup to about two.

A nominal capacity factor of 1.44 was maintained without interruption until August 16. The following table summarizes the performance of the solvent extraction batteries from August 9 to August 16:

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<u>Cycle</u>	<u>Log Gamma Decontamination Factor, dF</u>		<u>Per Cent Waste Loss</u>	
	<u>Uranium</u>	<u>Plutonium</u>	<u>Uranium</u>	<u>Plutonium</u>
Precycle	3.3	3.3	----	0.24
Partition	2.4	1.8	----	0.20
				(IBU 0.032)
Final	0.9	3.1	0.09	0.06
Over-all	6.6	8.2	----	----

On August 16, the HA and IA Columns were shut down for about two hours because of a local electrical power outage. As a result of the startup, the gamma activity in the uranium product climbed to a gamma ratio of 3.7 before it started to decline. In addition, one batch of plutonium product exceeded the product gamma specification and required processing at Recuplex.

The final uranium cycle was shut down on August 19 because essentially no partitioning of plutonium from uranium was being achieved in the IBX Column. The failure to partition was caused by an excessive sodium nitrite addition rate to the IAF tank. After the sodium nitrite rate had been adjusted, the IBX ferrous iron concentration was temporarily increased from 0.03 M to 0.05 M in order to regain partitioning more quickly. The off-standard 2DF was recycled to HAF for recovery of the plutonium.

On August 20, partitioning was recovered. Shortly thereafter, it became necessary to increase the acidity in the 2AF of the final plutonium cycle from 2.75 M HNO_3 to 3.6 M HNO_3 , in order to reduce the plutonium loss via the 2AW, caused by the increased sulfate concentration in the 2AF. When the sulfate concentration in the 2AF returned to normal, the nitric acid concentration in the 2AF was returned to 2.75 M without adverse effects.

On August 21, after the plutonium content of the 2DF was sufficiently low to prevent an excessive loss, the final uranium cycle was restarted. As a result of startup, the gamma activity in the uranium product climbed to a gamma ratio of four before it started to decline. The loss of partitioning caused about 25 tons of uranium to be recycled to the head-end. Also, about 135 units of plutonium in excess of the normal loss were lost via the 2DW.

Another local electrical power outage on August 24 caused the shutdown of the precycle and partition cycle solvent extraction columns for about ten minutes. Although the gamma activity of intercycle streams increased rapidly to about a factor of six over normal activity, the plutonium product remained within gamma specifications. However, the gamma activity of the uranium product climbed to a gamma ratio of 7.8 before it started to decline.

Even though the solvent extraction batteries were frequently upset, the Purex Plant was able to maintain product specifications with only a few exceptions. A total of three batches of plutonium exceeded specifications; the first two batches following the plant startup on August 9 exceeded the uranium specification, and one batch following the electrical power outage on August 16

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exceeded the gamma specification. A total of eight tons of uranium product produced during this period will require processing at the TBP Plant. The first four tons produced after the plant startup on August 9 exceeded the gamma specification and could not be reduced by silica gel treatment, and the first four tons produced following the August 21 plant startup exceeded the plutonium specification. Although the solvent extraction batteries decontaminated satisfactorily only 34 per cent of the uranium produced, the remainder was reduced to a gamma ratio of two or less by silica gel treatment.

During the month, a test was conducted to demonstrate the operability of the 2AF tank at increased capacity factors. The purpose of the test was to evaluate the degree of conversion of plutonium(III) to plutonium(IV) with decreased residence time in the tank. Holdup times equivalent to processing rates up to a capacity factor of 3.12 were attained without any detectable increase in the 2AW plutonium losses by lowering the liquid level in the 2AF tank.

Plutonium Concentration

After the plant startup on August 3, the transfer line between the L4 plutonium concentrator and the L6 plutonium receiver plugged which required a plant shutdown for removal of the solids from the concentrator system. Spectrographic analysis of the boiling nitric acid flushes generally indicated strong Na, Cr, Ni, Fe, and P concentrations. A considerable quantity of organic plus a black, oily, semi-solid material was removed by the flushes. Analysis of the organic indicated 50 to 100 g/l of plutonium, while the accompanying aqueous phase analyzed one to five g/l plutonium and five to eight molar nitric acid. After the nitric acid flushes were completed, three 20 per cent caustic flushes were made and the equipment given a final acid flush in preparation for startup.

Prior to startup, the flowsheet was modified as follows:

- a. The acid addition was adjusted to give 0.75 M HNO_3 in the 2BP to the stripper.
- b. Final plutonium concentration was increased to 120 to 130 g/l to reduce the HNO_3 /plutonium ratio.
- c. The stripping steam was increased 20 per cent during the startup period to assure complete stripping of entrained organic from the L4 concentrator feed.

With the exceptions noted elsewhere in this report, the plutonium product has met all specifications during the report period. However, efforts are being made to reduce the nitric acid concentration of the final plutonium product. This has been as high as 8.3 M during periods of recycled uranium but normally analyzes about 7.8 M. Since the startup on August 9, no evidence of excessive plutonium holdup or solids accumulation in the L cell package unit has been found.

Uranium Processing - Silica Gel

Following regeneration of the silica gel beds, 108 tons of uranium which had gamma ratios of 16 to 2.5 were reduced to a gamma ratio of 1.5. This uranium was processed at a capacity factor of 1.7 (60 gal/(hour)(ft²) and a temperature of 65 to 85 C. Increasing the feed temperature and reducing the feed storage time prior to processing have improved the performance of the silica gel beds during the month.

Organic Treatment

The over-all performance of both organic treatment systems are summarized below.

Organic Treatment System	Organic Activity, Microcuries/Gallon				Average Decontamination Factor	Organic Losses, Per Cent of Gallons Processed
	Unwashed		Washed			
	Max.	Min.	Max.	Min.		
No. 1	1.2 ⁶	1.0 ⁴	5700	400	6	0.41
No. 2	21.0	2.0	30	1	>1	

The wide variations in the activity level of the solvent and the higher than normal solvent losses are the result of four plant shutdowns and the rework of out of specification material. In general, the organic treatment systems contained the upsets, but some activity did break through to the washed solvent because of the unstable operation of the IO Column T-G2. Indications are that the IO Column is becoming increasingly more difficult to control and that the flooding frequency is decreasing.

Since the hot startup of the plant, the solvent has been routinely analyzed for per cent TBP, gamma activity, uranium extraction coefficient (E₂), color, and disengaging time. These analyses were requested to assist in determining a method for evaluating solvent quality. After ten months of operation, a data correlation indicates that gamma activity is the only analysis which is significant for quality control and, therefore, the latter three have been discontinued.

Waste Treatment

The acid recovery and waste treatment sections of the plant have operated without incident while processing both the column flushes and extraction wastes. The final waste (IWW) volume has been maintained at or less than flowsheet volume during the operating period. Approximately 82 per cent of the acid fed into the waste cell has been recovered as 50 weight per cent nitric acid.

Tank 241-A-103 currently contains approximately 331,000 gallons of waste, and the contents have continued to self-concentrate. At the end of the report period, 54,000 gallons of tank space have been made available by this method.

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Uneven or bumping boiling has continued without incident with pressures of five to ten inches of water being generated in the tank. Normally, one to three bumps are recorded per day. The estimated average boil-off rate at month's end is three to five gallons per minute.

URANIUM RECOVERY PROCESS TECHNOLOGY

Summary

Process performance was generally good, and feed aged as little as 14 months since irradiation to 250 MWD/T was processed without difficulty. Over-all uranium waste losses averaged 0.7 and 0.9 per cent of the gross and new (Tank Farm) feed uranium, respectively. The REU gamma activity was halved when 0.2 M phosphate ion was added to the second cycle acid scrub and, over the entire report period, averaged 100 per cent that of aged natural uranium.

The bottom of the mild steel liner of Tank 104-U is buckled and possibly ruptured. The condition of the liner and cause of failure are being investigated.

During the report period, one million gallons of scavenged waste with cobalt-60 concentrations less than the maximum allowable in drinking water (MPC) but greater than 0.1 MPC (the HAPD disposal limit) were transferred to crib on a trial basis. Also, one million gallons of scavenged waste with cobalt-60 concentrations greater than MPC were transferred to the ground on a "specific retention" basis.

A Plant scavenging procedure involving two point addition of inert cobalt to the waste was evaluated. Line samples show that cobalt removal from the waste was improved about four fold. Nevertheless, the final sample from the settling tank contained 8.5×10^{-4} microcuries of cobalt per milliliter (vice 4×10^{-5} microcuries per milliliter required for routine cribbing).

Solvent Extraction

Slightly slurry rich feed with an effective age of about 16 months since irradiation to 250 MWD/T was processed with no difficulty. Steady state RAW, RCW, and REW uranium losses were 0.2, 0.1, and 0.05 per cent of the gross feed uranium, respectively. The RCW losses increased ten fold when aged, decomposed organic phase from the RAF feed tank was returned to the in process organic inventory. This organic phase is entrained from the RA Column which is vented to the feed tank. After the transfer, these losses decreased rather consistently and finally returned to "normal" when the organic phase completed about 30 passes through the system.

Gamma decontamination was generally adequate and not significantly affected by the relatively young feed processed. The average over-all logarithmic gamma decontamination factor and REU activity were 5.2 and 100 per cent of that of aged natural uranium, respectively. Three product batches produced during a shutdown and the ensuing startup contained from 200 to 400 per cent of the

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activity of aged natural uranium. Because of the difficulty of concentrating this material if it were to be reworked, it was shipped to the UO_3 Plant and blended with low activity UNH.

The phosphate concentration of the RDIS was increased from zero to 0.2 M during a steady state period when essentially all the feed was aged about 15 months since pile discharge. As a result, REU activity decreased from 140 to 80 per cent of that of aged natural uranium, and the second cycle logarithmic decontamination factor increased from 2.1 to 2.5. Routine use of phosphoric acid in the RDIS will be recommended.

The amount of "filterable" activity in the RCU and REU has not decreased significantly since installation of cold stream filters during July, 1956. Filtration of samples of RCU and REU continues to give arithmetic decontamination factors of about 4.0 and 1.5, respectively.

Waste Treatment

Approximately one million gallons of scavenged waste with cobalt-60 concentrations less than the maximum permissible in drinking water (MPC; 4×10^{-4} microcuries per milliliter) but greater than the HAPD standard for cribbing (0.1 MPC) were transferred to the BC-3 crib on a trial basis. Eight million gallons of waste were previously cribbed in this site with no gamma emitting isotopes penetrating farther than the 100 foot depth and with no increase in ground water contamination below the crib. Therefore, this disposal is considered safe.

Approximately one million gallons of scavenged waste (the third "in-farm" batch and the 41st plant scavenged batch) containing cobalt-60 concentrations greater than the MPC were transferred to the BC-7 ditch on a specific retention basis.

A scavenging test in which cobalt sulfate was added to the waste was completed. Cobalt was added via the RDIS and the nickel sulfate so that the acid waste and neutralized waste contained 0.003 and 0.009 M cobalt, respectively. Preliminary results obtained during the test show that from three to five fold improvement in cobalt-60 decontamination was obtained. Samples taken from the underground tank after the sludge settled contained 8.5×10^{-4} microcuries of cobalt-60 per milliliter.

Tank 104-U

Photographs of the interior of Tank 104-U taken to determine the condition of the tank show that the mild steel liner is buckled upward. Electrode measurements indicate that the center of the tank is approximately five feet higher than it should be. The photographs do not show that the liner is ruptured; however, about one-half of the tank surface is covered with liquid and could not be observed. Additional photographs will be taken.

URANIUM CONVERSION PROCESS TECHNOLOGY

The quality of the UO_3 produced during August was excellent. The gamma activity, reactivity ratio, and total metallic impurities averaged 50 per cent that of aged natural uranium, 0.98, and 90 parts per million parts of uranium, respectively. Over 99 per cent of the production was capable of passing through 40 mesh screen. Production was somewhat curtailed, however, because of construction activity and pot room equipment failures.

Tests

As part of a program to better understand and to improve the operation of the acid recovery system, the fractionator (T-D-4) bottoms were measured and analyzed. Under normal operating conditions, with half of the UNH feed supplied by the TBP Plant, about nine pounds of uranium and 300 pounds of nitric acid are in 110 gallons of fractionator bottoms per day. It has been recommended that T-D-4 be operated as a phase separator rather than as a fractionator, abandoning the small amount of acid in the evaporator overheads but recovering entrained uranium. Thus, some slight cost saving will be made, and the net dilution of the recovered acid will be decreased.

 UO_3 CONTINUOUS CALCINER - PROTOTYPE DEVELOPMENT

The prototype continuous calciner was operated for a series of short runs during the month. Approximately ten tons of uranium oxide were produced containing 300 ppm parts of uranium at a bed temperature of 315 C and an agitator speed of 50 rpm. The reactivity of the UO_3 produced was 0.76 with 925 C and 600 C reduction and hydrofluorination temperatures, respectively. The bulk and packed densities were about 4.4 and 4.8, respectively, for the oxide as produced, and 3.7 and 4.5, respectively, for the milled product.

Sustained operation was hampered by frequent failure of the shaft seal packing, particularly that on the drive end. At month end, improvement in the seal service is being attempted by controlling the trough distortion by means of the furnace temperature distribution. A variety of alternate shaft seal materials have also been designed for testing.

234-5 DEVELOPMENTPlutonium Polymer

Several tests were run in an effort to establish the limiting conditions for formation of plutonium polymer in Purex 2BP. At acid concentrations above 0.5 M HNO_3 , essentially no polymer was formed when 2BP containing five g/l plutonium (50 per cent IV) was boiled under reflux, while below 0.4 M HNO_3 considerable solids were obtained which appeared to be polymer. In 2BP which was butted up to 9.5 g/l plutonium, a negligible amount of polymer, if any, was obtained above 1.3 M HNO_3 . Boiling solutions of nearly pure plutonium(IV) (five g/l) at 0.6 M HNO_3 , or less, gave a fine white powdery precipitate which, within a

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few minutes, converted entirely to typical polymer. Solutions of pure plutonium(III) (five g/l) upon boiling oxidized and precipitated polymer within four minutes at 0.4 M HNO_3 , but not at 0.6 M HNO_3 . At 0.2 M HNO_3 , no oxidation or precipitation occurred over one hour.

Precipitated polymer usually had very fine particles which were light green in color, although it appeared yellow when covered by supernate. The precipitate will dissolve in six to eight M HNO_3 , sometimes quite readily and other times upon standing for a few hours. However, within a day or two, it dissociates into normal plutonium(IV). Heating the dissolved polymer will also cause dissociation. Polymer in colloidal state has been coagulated by increasing the acidity to ca three M HNO_3 .

Purex Tube Bundle Solids

A white solid taken from the product concentrator tube bundle was soluble in boiling 1.0 M and 13 M NaOH and was insoluble in boiling nitric acid and insoluble in six M HNO_3 - 0.1 M HF at room temperature. Spectrochemical analyses indicated the material was predominately silica.

Spectrophotometric Analysis of Redox E-1 and E-3 Tank Material

During the July shutdown of Redox, a slow precipitation of plutonium was observed in some of the tanks. Samples were taken from the E-1 (3AF) and E-3 (3BP receiver) tanks and from the flushes of these tanks after startup. These samples were submitted to the 234-5 Development Laboratory for analysis and plutonium valence distribution determination. The cause of the observed gradual precipitation was not proved, although oxalate precipitation was strongly indicated.

Spectrophotometric analysis made upon immediate receipt of the samples (July 24 and 25) and after intervals of three, six, and eight days showed the solutions to be mainly plutonium(IV) with some trace of plutonium(VI) in the E-3 samples. No indication of plutonium polymer was observed. There was a small amount of precipitate in one sample which was submitted to the analytical laboratory for a carbon analysis. After drying, the sample analyzed 9.1 per cent carbon. Pure plutonium oxalate ($\text{Pu}(\text{C}_2\text{O}_4)_2 \cdot 6 \text{H}_2\text{O}$) would analyze 9.2 per cent carbon. The agreement is considered relatively good under the difficult analysis conditions with the small sample available. Hence, the slow precipitation is probably due to plutonium oxalate precipitation.

Examination of Crud from Redox Concentrator Valve

Solids taken from the L-3 to L-4 valve and reported on last month were largely soluble in boiling six M NaOH. A dense black residue was insoluble in the caustic, in boiling concentrated nitric acid, and in aqua regia. Spectrochemical analysis of the as received crud indicates chromium, iron, and silicon to be the predominant constituents. Spectrochemical analyses of the dense black material were inconclusive.

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CHEMICAL RESEARCH SUB-SECTION

PUREX

Mini Runs

Two 1A-1C runs were made comparing the decontamination performance of "high-acid" and "low-acid" second cycle flowsheets. Feed used for these runs was prepared from the uranium product (HCP) produced in a low-acid precycle run reported last month.

The flowsheets employed and the decontamination results obtained in these runs are summarized in Table I.

TABLE I

1A-1C DECONTAMINATION

Low Acid Flowsheet:

1AF: 1.7 M U, 0.83 M HNO ₃	Flow: 100
1AS: 2.0 M HNO ₃	Flow: 67
1AX: 30% TBP in Shell E-2342	Flow: 445

High Acid Flowsheet:

1AF: 1.35 M U, 2.0 M HNO ₃	Flow: 100
1AS: 3.0 M HNO ₃	Flow: 67
1AX: 30% TBP in Shell E-2342	Flow: 366

DECONTAMINATION FACTORS

Flowsheet	<u>1AF to LAP</u>			<u>HAF to LAP</u>	
	<u>Ru</u>	<u>Zr</u>	<u>Nb</u>	<u>Ru</u>	<u>Zr-Nb</u>
Low Acid Precycle / Low Acid 1A	27	49	450	3.5×10^4	7.4×10^5
Low Acid Precycle / High Acid 1A	62	18	$>450^a$	8.0×10^4	2.7×10^5

a) Nb activity below gamma spectrometer detection limit.

The product gamma ratios were two for the product of the high acid second cycle run and five for the product of the low acid second cycle runs. Improved ruthenium decontamination was responsible for the better overall decontamination observed with the low acid precycle-high acid second cycle combination. Whereas

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zirconium and ruthenium contributed about equally to the gamma activity in the product from the high acid second cycle, ruthenium was the predominant gamma activity in the product from the low acid second cycle. Presumably this effect would have been more pronounced had a 1B column been employed since normally ruthenium splits predominantly toward the uranium stream.

It appears from these data that the combination of a low acid precycle flowsheet and a high acid second cycle flowsheet is probably capable of yielding adequately decontaminated uranium product after only two cycles of solvent extraction, at least with "reagent-grade" solvent. Further studies will examine the effect on decontamination of combining a high acid precycle flowsheet with high and low acid second cycle flowsheets.

An unshielded 16-stage Mini unit has been installed as an auxiliary scrub section for the shielded 21-stage Mini unit. With this apparatus, it is planned to study the effect of "tailored" scrub sections on decontamination. For example, one of the two scrub sections can be optimized for ruthenium decontamination, the other for zirconium-niobium decontamination.

The first run made with this revised set up employed the 21-stage unit as a 12-stage extraction, 9-stage scrub dual-purpose unit and the 16-stage unit as a heated auxiliary scrub section. The organic was scrubbed with 1.5 molar nitric acid in the shielded unit, then heated to 60 C and scrubbed with 4 molar nitric acid (at 60 C) in the 16-stage auxiliary scrub unit. The aqueous effluent from this unit was recycled to a feed point three stages deep in the extraction section of the shielded Mini unit. There was no stripping unit employed in this run. The flowsheet employed for this run was as follows:

HAF: 1.7 M U, 0.83 M HNO_3	Flow: 100
HAS-1: 1.5 M HNO_3	Flow: 67
HAX: 30% TBP in Shell E-2342	Flow: 480
HAS-2: 4.0 M HNO_3	Flow: 67

Decontamination factors observed, from aqueous feed to organic product, were 6×10^4 for zirconium-niobium, 5.7×10^4 for ruthenium, and 8.0×10^4 for total gamma activity.

This represents an improvement by a factor of about ten for zirconium-niobium decontamination and an improvement by a factor of about sixty for ruthenium decontamination, for this flowsheet as compared with a typical "low-acid" HA column flowsheet.

Zirconium-niobium limited gamma decontamination in this run so further runs will concentrate on means of improving zirconium-niobium decontamination. Attention will be given both to methods which would be applicable to feeds from which both uranium and plutonium are to be recovered and to feeds from which only uranium is to be recovered.

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Zirconium Chemistry

Additional successive scrubbing studies have confirmed the tentative conclusion advanced last month, viz., that organophilic zirconium species stem from complexing agents present in minute concentrations in hydrocarbon diluents. Thus, it is found that successive scrubbing of a TBP-CCl₄ extract of zirconium tracer results in no change in the distribution coefficient of zirconium. With a TBP-hydrocarbon extract of the zirconium tracer, however, successive scrubbing results in an apparent fractionation of zirconium into two or more species, at least one of which is highly organophilic. The concentration of the organophilic species, however, appears to be different for different organic diluents (nil for carbon tetrachloride smaller for Soltrol 170 than for Shell E-2342) and, in fact, different for various batches of the same diluent (Shell E-2342).

It was also reported last month that evidence had been obtained for a "hydrophilic" zirconium species which apparently exists in plant dissolver solutions but not in synthetic solutions. This has been confirmed and traced to an impurity present in uranium metal. It has been found that:

- (1) Contacting diluted Purex dissolver solution with 30 percent TBP in Shell E-2342 results in zirconium distribution coefficients three to 10-fold lower than are obtained when organic extracts of Purex dissolver solution are recontacted with cold aqueous solutions of the same gross composition as the original dissolver solution or when solutions prepared from crystalline uranyl nitrate, nitric acid, and TTA-purified zirconium tracer are employed. The effect was found to be more pronounced at low acidity, the distribution coefficients differing by a factor of greater than ten at one molar nitric acid but only by a factor of about three at seven molar nitric acid.
- (2) The lower extractability found for the plant dissolver solution can be reproduced by dissolving cold uranium metal in nitric acid and then spiking zirconium tracer into the solution. Further, identical results were obtained whether the dissolution was carried out at ambient temperature and terminated at high acid (6 to 8 molar nitric acid) and low uranium (0.5 molar) or carried out at elevated temperature and terminated at high uranium (2.6 molar) and low acid (1 molar).
- (3) Simmering of the dissolved metal solution with urea for 30 minutes prior to spiking with zirconium tracer did not alter the zirconium distribution.

The possibility that silica in the uranium metal is responsible for this effect is being tested at present.

Transfer Rates

An apparatus for the measurement of transfer rates in solvent extraction systems has been completed and its operating characteristics established for a TBP-hydro-

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carbon solvent system. The apparatus employs individually stirred phases of about 400 ml each separated by an interface about 40 cm² in area. Transfer across the interface is followed by withdrawing analytical samples through capillary tubes which extend into each phase.

Representing the transfer process by a simple expression, first order in the transferring species, results obtained in preliminary shakedown runs employing nitric acid and/or uranyl nitrate and TBP in Amsco 125-90W may be summarized as follows:

- (1) The rate "constant" for extraction of nitric acid is proportional to the TBP concentration over the range 10 percent to 40 percent TBP in Amsco 125-90W.
- (2) The rate "constant" for extraction of uranyl nitrate doubles as the TBP concentration is increased from 10 percent to 20 percent but is constant over the range 20 percent to 40 percent TBP.
- (3) The rate "constant" for extraction of nitric acid increases as the initial concentration of nitric acid increases, suggesting that the original assumption of a first-order transfer mechanism requires modification. This is further indicated by the fact that the assumed first-order mechanism appears valid even in a single experiment only during the initial one-third or one-fourth of the transfer process.

Organophosphorus Complexing Agents

The large range of complexing ability observed for the esters of oxyphosphorus acids has suggested the possibility of synthesizing organophosphorus chelating agents. Adding a carboxylic acid group to one of these esters would provide the acid function while retaining the basic oxygen of the phosphoryl group. A compound of this type, dibutoxy phosphoryl acetic acid, has been prepared and its physical properties determined.

The ethyl ester of this compound was prepared by the Michaelis-Arbuzov reaction.



The ethyl group was removed by caustic hydrolysis. The structure assignment was supported by titration, molecular refraction and by infrared absorption spectra, the latter showing the presence of P-O-C bonds, P-C bonds and the phosphoryl and carboxylic acid groups. Physical properties measured for this compound are as follows:

n_D^{25}	1.444
d_{25}^{25}	1.102 g/cm ³
pK _a	3.3

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A ten percent solution of this compound in carbon tetrachloride was found to be a very efficient extractant for uranyl nitrate. Further tests will be concerned with differentiating between chelate formation and simple solvation and with determining the relative complexing ability of this compound for zirconium(IV) and plutonium(IV). A fraction of the compound will also be hydrolyzed to the carboxylic phosphonic acid, which presumably should form stable organic-insoluble complexes.

Solvent Treatment

Work reported previously has shown that used solvent may be effectively decontaminated by contact with alkaline permanganate or by contact with preformed hydrous oxides of manganese.

Studies completed during the report month indicate that effective decontamination of solvent can also be accomplished by contact with manganese oxides prepared by calcination of manganese(II) carbonate at 350 C or 500 C. These materials have very high specific surface areas (134 m²/g for the 350 C product, 54.2 m²/g for the 500 C product) and exhibit a different x-ray diffraction pattern than does the readily available pyrolusite (manganese dioxide).

Results obtained in studies in which solvents of various origin were contacted with these materials (mainly the product of the 350 C pyrolysis) may be summarized as follows:

- (1) The efficiency of removal of fission products by this scavenging process varies with the treatment to which the solvent is subjected prior to the scavenging step. Treatment of a sample of Purex G-7 solvent (obtained May 25) with 12 g/l of this solid at 25 C resulted in gamma decontamination factors of 1.6, 2.7, and 13 when the solvent was subjected to pre-treatments consisting of, respectively, three washes with equal-volume portions of one molar nitric acid, two washes with equal-volume portions of three percent sodium carbonate, and two washes with equal-volume portions of 10 percent sodium hydroxide.
- (2) The efficiency of removal of fission products increases with increase in temperature. For example, scavenging of a Purex G-7 sample (obtained May 25) with 12 g/l solid resulted in a gamma decontamination factor of 13 at 25 C versus 35 at 70 C.
- (3) Presence of a bulk aqueous phase (water or 3 percent sodium carbonate) prevents effective scavenging by these materials.
- (4) Partial removal of solvent degradation products is accomplished by scavenging with manganese oxides. This is shown by the fact that the color of degraded solvents is decreased, "C" contact E₈ (U) values are reduced, and decontamination performance is somewhat improved by this treatment.

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- (5) As little as 2.0 grams per liter of the solid manganese oxides suffices to yield adequate decontamination from fission products.
- (6) This scavenging process is effective in removing dibutyl phosphate also.

WASTE TREATMENT AND FISSION PRODUCT RECOVERY

Cesium Recovery from Purex Waste

Work on the zinc cesium ferrocyanide process for the recovery of cesium from Purex IWW was continued during the month. Major emphasis was directed at determining the effect of aluminum on cesium recovery, measuring the amount of cesium "volatilized" in the calcination - chlorination reaction, and establishing the radiation stability of zinc cesium ferrocyanide itself.

Large concentrations of aluminum will be introduced into the Purex process if co-dissolution of cans and slugs is adopted. For present Hanford slugs, this would result in an aluminum nitrate concentration of about 1.8 M in the IWW, and hydrolysis of this aluminum (even in the absence of nitric acid) yields a pH of about zero, much too low for satisfactory scavenging of cesium with zinc ferrocyanide. Attempts were accordingly made to neutralize the solutions to a pH of 3 to 4, where the scavenging is effective. Neutralization to pH 3 with sodium hydroxide resulted in hydrous aluminum oxide precipitates which re-dissolved only slowly upon prolonged boiling. Urea hydrolysis formed very stable gels at pH 4. These gels were not affected by heating, either with or without addition of water, but were readily dissolved by addition of acid. The work is continuing.

The formation of a small amount of a white deposit on the colder portions of the apparatus has been observed during the calcination - chlorination conversion of zinc cesium ferrocyanide. From a chemical viewpoint volatilization of cesium under these conditions is unlikely; nevertheless, this material was soluble in water and gave a positive test with chloroplatinic acid, which suggested that it might be a cesium compound, perhaps CsCN. Although this was equivalent to the loss of only a few percent, at most, of the charge, it could constitute a severe contamination problem. Some quantitative experiments were accordingly carried out with zinc cesium ferrocyanide traced with cesium-137 to determine the severity of the problem. The off gasses were passed through scrubbers, and the furnace tube and connectors were washed free of any deposit following the chlorination. These solutions were combined and assayed. The cesium losses were found to be very low. Calcination - chlorination of a zinc cesium ferrocyanide which had been dried at 110 C for 24 hours "evaporated" only 0.008 percent of the cesium. A nearly identical loss of 0.01 percent was obtained with a precipitate which had been dried for four hours. An air dried material gave a loss of 0.039 percent. The bulk of the white deposit and the positive test with chloroplatinic acid is probably an ammonium compound formed by reaction of ferrocyanide and water.

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A preliminary measurement was made of the radiation stability of zinc cesium ferrocyanide by exposing a seven gram sample for 216 hours in the cobalt-60 source and determining the rate of gas evolution. The yield was equivalent to 1.7×10^{-5} moles of gas per watt hour or to 0.045 molecules of gas per 100 ev. This would correspond to about 0.15 moles of gas per year from a 500 curie Cs-137 source and to a time of about one year for complete decomposition, assuming the rate remained constant and that no steady state was attained. It is possible, however, that these figures are grossly in error due to the low dosage rate (4.7×10^5 r/hr), to the possible formation of gas by decomposition of sealing agent, to trapping of gas in the crystal lattice, or to adsorption on the equipment. Experiments in an all glass system with the higher flux of a Van der Graff generator will, it is hoped, resolve these points.

Strontium and Cerium Recovery from Purex Waste

As pointed out last month, the study flowsheet given in HW-43835 recovers cesium satisfactorily but was found to give unexpectedly poor yields of strontium and cerium. Recently completed analyses indicate that less than ten percent of the strontium was contained in the final strontium rich fraction and that less than one percent of the initial cerium was found in the cerium product. Intensive work is therefore being carried out on alternate schemes for separating and recovering strontium and the rare earths from the uranium rich solution which is obtained by dissolving the uranium cake from the second (high pH) precipitation in the proposed flowsheet.

A number of schemes have been investigated for separating the uranium from the strontium and cerium. These include: fluoride precipitation of strontium and cerium; uranyl peroxide precipitation of uranium; extraction of the uranium with tributyl phosphate; hydroxide precipitations with carbonate complexing (and solubilization) of uranium; and hydroxide precipitation with glycerol complexing of uranium. The first three worked very well, but the latter two failed. Thus precipitation of the rare earth and alkaline earth fluorides with 1 M hydrofluoric acid gave a small volume cake and strontium recovery of better than 95 percent. Uranyl peroxide precipitation of pH 1 was quantitative and resulted in negligible carrying of the desired fission products, which can then be recovered from the supernate. A single batch extraction of cake solution with a volume of 30 percent TBP equivalent to one-tenth of the initial IWW removed sufficient uranium to permit oxalate precipitation of the rare earths. Carbonate complexing, on the other hand, failed to hold uranium in solution, and glycerol complexing was too effective, i.e., much of the strontium and cerium was also retained in solution.

Additional work was done to develop satisfactory methods for recovering and purifying strontium and cerium from the above solutions. Oxalate precipitation was found to give a good separation of the rare earths from strontium when carried out in acidic solution. Thus addition of 0.5 M oxalate to a peroxide supernate 0.1 M in nitric acid precipitated 95 percent of the cerium

and only seven percent of the strontium. With 0.1 M oxalate, only four percent of the strontium appeared in the precipitate. A nitric acid concentration of 0.1 M was near optimum. Cerium recovery was only 70 percent at 0.5 M HNO_3 and little or no precipitate was obtained at 1 M HNO_3 . From these results it appears that oxalate precipitation will be a satisfactory step for rare earth recovery following uranium removal by either peroxide precipitation or TBP extraction.

Two methods were found for recovering strontium from the oxalate supernate. Barium carbonate precipitation, after destruction of excess oxalate with bromate, carried 99.2 percent of the strontium. High pH precipitation of ferric hydroxide carried 99.5 percent. The latter did not require destruction of the oxalate.

Separation of cerium from the other rare earths was best accomplished by a homogeneous iodate precipitation. This involved persulfate oxidation of an iodate containing solution and gave a cerium purity of better than 95 percent.

Flowsheets are being prepared, based on these findings, for purposes of economic and engineering evaluation.

FISSION PRODUCT CHEMISTRY

Solvent Extraction Behavior of Ruthenium

Multiple extraction - scrub studies have been performed both on Purex plant feed solution and on plant dissolver solution in an effort to determine the number and relative abundance of ruthenium species present. (c.f. HW-44219-H, p. 55 and HW-44580-H, p. 39). Qualitatively, the results indicate that most of the ruthenium is present as an organophobic species with a low distribution coefficient (E_d) but that a small fraction consists of one or more organophilic species, at least when 30 percent TBP-Soltrol 170 is employed as extractant. Analyses were also performed for zirconium, and it exhibited a very similar behavior. Quantitative interpretation of the data was rendered difficult by the very large analytical uncertainty in the numbers, particularly in the case of the successive scrubs since the final activity was very low.

Zirconium Isotopic Dilution Experiments

The effect of inert zirconium on the distribution of radio zirconium into TBP from 3 M and 6 M nitric acid solutions was reported previously. Additional experiments indicate a very similar behavior in the case of hexone extraction from 0.5 M HNO_3 , 1.5 M ANN solutions. Increasing the total zirconium from tracer concentration to 0.1 M caused the fission product zirconium extraction coefficient to decrease from a value of 0.22 to 0.05, or by very nearly the same factor that was observed in the 3 M HNO_3 , 30 percent TBP - Soltrol case.

In other experiments, the distribution coefficients of "cold" zirconium and tracer zirconium between 3 M HNO_3 and 30 percent TBP - Soltrol were shown to be

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equal (at the same total zirconium concentrations). This appears to confirm the theory that a labile equilibrium exists between the zirconium monomer and zirconium polymer.

URANIUM PROCESSING

Flurex Processing

Further experiments have been performed to determine the current efficiency for reduction of uranyl ion as a function of the cathode current density. The electrical resistance of Nepton CR 61 membrane has been studied as a function of current density and concentration of electrolyte, and some tests have been carried out on other recently acquired membranes to determine their utility in the Flurex process.

Data from four runs in which 0.05 molar stannous ion was added to the catholyte are recorded in Table II.

TABLE II

RUN SUMMARIES - FLUREX PROCESS

Feed solution: 0.6 M $\text{UO}_2(\text{NO}_3)$

Catholyte: 1 M F^- , 0.05 M Na^+ , 0.05 M Sn^{++} , 0.2 M UO_2^{++}

Anion Transfer Membrane: Permutit 3148

Cation Transfer Membrane: Nepton CR 61; except Run 18, Permutit 3142

Run No.	Cathode Current Density amp/in ²	Membrane Current Density amp/in ²	Cell Voltage V	Current Passed F	Reduction ^(a) Occurring eq.	Current Eff.	Energy ^(b) Yield lbs/kwh
15	2	0.22	40-45	0.154	0.149	0.97	0.22
16	3	0.33	50-55	0.360	0.338	0.94	0.18
17	3	0.33	43-50	0.342	0.327	0.96	0.20
18	4	0.44	44-55	0.446	0.413	0.93	0.18

a) Based on uranium(IV) and tin metal found in cathode.

b) Calculated from $\text{lbs/KWH} = 9.8 \frac{\text{C.E.}}{\text{V}} = 9.8 \frac{\text{C.E.}}{\text{IR}}$

The energy yield of Run 15 is believed to be low as earlier runs at 2 amp/in² current density gave values of 0.24 and 0.28 lbs/KWH. The low yield in Run 15 results from an unusually high IR drop across the CR-61 membrane, for which there is no obvious explanation. In fact, all evidence points to a constant

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resistance for the CR-61 membrane. Data from five Flurex runs in which the membrane current density was varied from 0.2 to 0.6 amp/in² showed an average membrane resistance of 90 $\pm$ 10 ohms per square inch based on rather crude IR drop measurements across the membrane using platinum probes in the solutions adjacent to the membranes and a vacuum tube voltmeter.

A more formal study of membrane resistances as a function of concentration and current density was carried out in a cell in which a single CR-61 membrane (one square inch in area) was used to separate a catholyte of 0.1 molar nitric acid from the anolyte containing the ion under study. Measurements were again made with a vacuum tube voltmeter, this time with the platinum probes actually touching the membranes on both sides. The membrane resistance in the presence of uranyl ion was relatively constant (68-72 ohms) in the range of 0.1 to 0.4 amp/in² current density but was considerably lower than the value from Flurex runs. The technique of measurement is believed responsible for the discrepancy. The data are summarized in Table III. The much higher resistance of the membrane to passage of uranyl ions as compared to hydrogen or sodium ions is evident from these data.

TABLE III

VARIATION OF APPARENT RESISTANCE
OF CR-61 MEMBRANE WITH CURRENT DENSITY

<u>Anolyte</u>	<u>Membrane resistance (ohms)</u>					
1 M UNH	52	60	68	70	74	72
1 M NaCl			23	16	13	11
0.5 M HCl		29	15	9	6	5
Current density amp/in ²	0.024	0.05	0.10	0.20	0.30	0.40

The effect of temperature on the resistance of the membranes is unknown, but the variation is believed small over the range of these experiments.

Permselectivity studies on Permutit 3148 anion transfer membranes showed it to be superior to Amberplex A-1 with respect to nitrate transfer into nitric acid solutions. The transference numbers for nitrate as a function of anolyte nitric acid concentration are reported in Table IV.

TABLE IV

TRANSFERENCE NUMBERS OF NITRATE ION AS A FUNCTION
OF CONCENTRATION OF NITRIC ACID IN THE ANOLYTE

<u>Anolyte Concentration</u>	<u>Nitrate Transference Number</u>	
	<u>Amberplex A1</u>	<u>Permutit 3148</u>
0.1 M	0.74	0.88
0.5 M	0.37	0.67
1. M	--	0.33

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DECLASSIFIEDPreparation of Uranium Hexafluoride

Continued study of the reaction of sodium uranic fluoride (NaUF_5) with fluorine has been concerned with the effect of temperature on the rate of fluorination and the feasibility of complete consumption of the fluorine.

Five gram samples of 0.25-inch diameter pellets of NaUF_5 were supported in a 5/8-inch I.D. vertical reactor, and a 50 volume percent argon-fluorine mixture was passed through the bed at a rate of 100 ml/min for 30 minutes. (Under these flow conditions, the fluorine was about 400 percent in excess). The effect of temperature on the completeness of conversion was studied over a bed temperature range from 300 to 550 C. The data are recorded in Table V and show the desirability of an operating temperature of about 450 C. A similar experiment at 550 C resulted in fusion of the contents within five minutes after admission of the gas mixture. Changing the gas mixture to 25 percent fluorine delayed the time of fusion to 12 minutes. Using fused and ground (4-16 mesh) NaUF_5 under the initial conditions also resulted in fusion within five minutes at 550 C.

TABLE VCONVERSION OF NaUF_5 TO UF_6 - EFFECT OF TEMPERATURE ON YIELD

Temperature	-	C	300	350	400	450	500
Residual U	-	%	47	18	0.29	0.03	0.03

Two experiments were also performed in a 1.37-inch I.D. reactor. In the first (at 400 C) insufficient time resulted in incomplete conversion; however, residue at the bottom of the column contained less than 0.5 percent uranium. In the second experiment (at 450 C) with 100 percent excess fluorine, the bed residue contained only 0.7 percent of the initial uranium and this mostly in a few unreacted lumps at the top of the column. A sample from the bottom contained about 0.1 percent uranium. Some fusion occurred during this experiment. A thermochemical study will be made to establish maximum fluorination rates permissible under a variety of conditions.

The feasibility of completely scavenging fluorine from a gas stream was demonstrated in an experiment in which 28 grams of NaUF_5 pellets (a bed 3.5" deep in the 5/8" I.D. reactor) were exposed to a 50 ml/min flow of 50 percent argon-fluorine at 450 C for 25 minutes. The fluorine was about 37 percent of the stoichiometric amount for conversion to UF_6 . The effluent gas was passed through a dry ice trap for removal of the UF_6 and then into standard sodium hydroxide solution. No change in the normality of the caustic was considered evidence for complete consumption of the fluorine. This experiment suggests a mode of operation in which diluted fluorine would be passed consecutively and counter currently through two columns containing NaUF_5 . Diluted fluorine would be introduced at the bottom of the second column from which NaF would be removed. The upstreaming gas would react with the contents and leave the top of the column as a mixture of diluent,

fluorine and uranium hexafluoride. The latter would be removed and the depleted fluorine would be cycled to the bottom of the first column. In this column, the fluorine would be completely removed and intermediates capable of complete conversion to UF_6 would be formed. The effluent gas stream would contain only the diluent gas and uranium hexafluoride. Such a processing scheme would have the advantage of good heat distribution and no fluorine recycle.

UO₃ Studies

Experiments were continued to determine the feasibility of converting uranium trioxide to uranic fluoride by reaction with ammonium fluoride. Uranium trioxide (0.02 moles) and ammonium fluoride (0.08 moles) were heated in a magnesia lined bomb to 460 C over a period of 30 minutes and held at that temperature for the same time interval. A maximum pressure of 270 psig was observed which fell to 10 psig on cooling. Ammonia was produced as well as a thin layer of green powder, but the residue was mainly UO₃ or possibly UO₂F₂. Attack of the magnesia crucible and the stainless steel bomb indicated a loss of hydrofluoric acid to these sources. A second experiment using a 15 percent excess of ammonium fluoride, intimate mixing of the reactants and omission of the magnesia liner resulted in a solid residue of olive green powder with a bright blue-green surface layer. The product has not been identified.

ISOTOPE SEPARATION

Thermal Diffusion

Additional analyses of profile samples from the refrigerated uranyl nitrate-TBP experiment reported in HW-41702-H have been received. The results are summarized in Table VI.

TABLE VI

URANIUM-235 CONCENTRATION PROFILE - THERMAL DIFFUSION

Column Annulus: 0.20 mm
Coolant Temperature: -21 C
Steam Temperature: 116 C
Steam Consumption: 1.9×10^5 cal/min
Product Removal Rate: 1 ml/day.

<u>Displaced Liquid</u> ml	<u>Uranium-235</u> percent
0 - 0.8	0.7167
0.8 - 1.3	0.7173
4.5 - 6.5	0.7131
12.0 - 14.0	0.7120
20.2 - 22.2	0.7096
26.2 - 28.5	0.7127

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The anomalous rise at 28 ml is undoubtedly due to an eccentricity of the inner tubes which caused a distortion in the heat flow and resulted in an external hot spot. The effective length of the column was about four feet, and in this length a separation factor of 1.011 was achieved.

Little difference was found in behavior of "dilute" (220 g/l U) and "concentrated" (330 g/l) uranyl nitrate - TBP solution in the 0.20 mm thermal diffusion column - after about a week the enrichment (0.718 percent U-235) was nearly the same for both cases.

Chemical Exchange

A batch contacting experiment conducted under such conditions as to give a two theoretical stage separation showed no isotope effect. In this experiment an aqueous phase containing 0.014 M MCl_4 and 1 M HCl was equilibrated with 0.094 M TTA in benzene. No further work under these conditions is contemplated.

NEW PROCESSES

Plutonium Anion Exchange Process

Continued work has been done to test the feasibility of recovering plutonium from the Purex IWW stream. Seven liters (about 580 column volumes) of synthetic IWW solution containing 50 mg/l plutonium and flowsheet concentrations of uranium, iron, sulfate, phosphate, sodium, and nitric acid were passed through a 40 cm long, 0.6 cm I.D. column of Dowex-1, X-8 (50-100 mesh). The effluent was sampled at intervals to establish the break-through characteristics of the system. Although analyses are incomplete, it appears that an average loading of about 25 milligrams of plutonium per milliliter of wet resin was obtained (about 300 mgs or 500 column volumes) before appreciable breakthrough occurred. At conclusion of the run the effluent concentration was about 20 percent of the feed concentration and 92 to 95 percent of the feed plutonium was on the column. Breakthrough did not occur until the visibly green plutonium band was about 4 to 5 cms from the bottom of the resin bed.

Slugs and emulsions of 30 percent TBP - Soltrol were found to have almost no effect on the sorption of plutonium from seven molar nitric acid. In fact, Dowex-1 which had been wet with seven molar nitric acid would slowly sorb plutonium from 30 percent TBP - Soltrol.

Since Purex IWW can vary somewhat in nitric acid concentration, experiments were performed to determine the breakthrough characteristics of feed solutions either 6 or 7.2 M in HNO_3 . Analytical results are incomplete.

Elution studies have so far disclosed no wholly suitable eluting agent. Dilute nitric acid is the only elutant which does not cause some gassing, but its elution kinetics are slow.

Fused Salt Electromigration Process

The dissolution of a five gram piece of uranium - zirconium alloy, placed in a BaCl_2 - NaCl-KCl eutectic mixture, was effected by anodic chlorination at 620 C. After passage of 300 ma for four hours, a sharply bounded layer of UCl_4 had displaced the eutectic originally in the anode chamber and separation tube. The zirconium appears to have sublimed, as the chloride, from the anolyte to a cooler portion of the anode tube. Zirconium content of the UCl_4 was <0.5 wt percent as compared to 4.7 wt percent in the original alloy.

ANALYTICAL DEVELOPMENT

Coulometric Titrations

The studies of coulometric titration techniques applicable to plutonium assay were continued using ceric and dichromate standards in the study of titration conditions. In the use of ceric to oxidize plutonium the excess oxidant must be removed without affecting the plutonium valence state or the subsequent titration. The use of chloride and sodium azide as reductants, and of fluoride as a complexing agent were studied. In 2 M perchloric acid, a 100-fold excess of chloride appears to reduce the ceric ion completely at 90 C in ten minutes. Azide reduces some dichromate in addition to ceric so it is expected to reduce Pu(VI) as well, while the fluoride-ceric complex did not completely eliminate the interference of ceric with a dichromate-ferrous endpoint. Accordingly, ceric would also interfere with a plutonium-ferrous endpoint (ferrous generated electrolytically).

Uranium Isotopic Analysis

The laboratories have been asked to perform confirming analyses of uranium-aluminum alloy enrichment slugs for uranium and U-235. The slugs are "standard" pieces used to calibrate reactivity test piles (Hanford 305 Pile and DuPont NTG at Savannah). The first group of slugs are from the Savannah River plant, and a subsequent group of HAPC "C" slugs is anticipated. Lacking a mass spectrometer suitable for the isotopic analyses, an attempt is being made to adapt the U-235 gamma count method previously reported by D.G. Miller (HW-39969). Questions to be resolved are (1) the influence of daughter equilibrium, (2) the best physical form for the counting samples, and (3) calibration standards preparation. The work thus far indicates that direct gamma counting of dissolver samples of the slugs is feasible.

Miscellaneous

Calibrations were completed on the five gas scintillation fission counters previously discussed. For calibration, two plutonium samples of known Pu-240 content were used and the results were in good agreement. A subject report describing the instrument is being prepared.

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A "Tracerlab" five peak analyzer for gamma spectrometry was received and checked out for use in analytical service activities. The instrument meets all specifications.

A universal mount for multiplier phototube-scintillation crystal combinations which will permit simple interchange of crystals and multipliers in any size up to five inches was designed. Four inches of lead shielding is provided.

IN-LINE ANALYSIS

Uranium Photometry

Development was continued on the "Dual beam" photometer sensing unit mentioned previously. The incentive for this work is the substitution of a simple internal standardization for remote standardization by means of solutions. For aqueous uranium solutions, a 1-millimeter cell has been chosen and a neutral density filter of an optical density of about two was found necessary in the red light beam (the "standardize" position with a Corning 3484 filter) to give comparable light intensities in the blue and red filter positions. The sensitivity of the prototype for uranium is excellent and the design principle is sound. Some long-term stability problems remain.

Dielectric Constant

A high frequency dielectric constant meter (Sargent Oscillometer) is being tested for stability and used to study the analysis of plant streams for uranium and TBP. The dielectric constant method is used in the HAPO laboratories for the determination of TBP in kerosene-type diluents. The Sargent Oscillometer proves to be not sufficiently reproducible and stable for an in-line analysis application although it is a good laboratory instrument. The dielectric constant method is, however, a very sensitive one for monitoring TBP in the 1T0-and 2T0-type samples, and a suitable instrument can probably be developed if the need for TBP monitoring arises.

The application of the dielectric constant technique for monitoring uranium in organic phases is also being explored. This is not feasible in the case of TBP solvents (Purex) because of the aforementioned sensitivity to TBP concentration variations. However, in the case of Redox hexone streams, the sensitivity to uranium seems adequate. The method will be studied further since uranium photometry is not applicable to hexone solutions because of the organic color.

Uranium Polarography

Continued work was carried out on the use of square wave polarography as a possible in-line analysis method. The gating circuit for use in the square wave polarography instrument was completed and tested. The square wave polarograph was proven to be practical and was shown to allow analysis of metal ions at concentrations as low as 1.0×10^{-5} moles per liter, with the possibility of going lower with minor

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improvements. Using this instrument, determinations of uranium in nitric acid solutions at concentrations as low as 0.003 grams per liter without interference from iron or dissolved oxygen were demonstrated. Small amounts of TBP interfered with this determination, but the TBP was effectively removed from the water phase by mixing the solution with a small amount of kerosene by gas sparging. This eliminated the TBP interference. The square wave polarograph is a possible in-line instrument for monitoring plant streams for uranium, but the present circuit will have to be carefully redesigned to obtain linearity and greater stability.

Because of the wave generated when TBP was present, some polarograms were run with nitric acid solutions of TBP alone. It was shown that the square wave polarograph may be used to measure low concentrations of TBP in aqueous solutions.

LABORATORY SERVICES

Laboratory Services activities may be summarized as follows: 90,000 gallons of crib-level waste was transported to 200 West Area for disposal. Average plutonium analysis was 5.5×10^{-5} uc/ml. Average beta analysis was 3.7×10^{-2} uc/ml.

Approximately 3,000,000 gallons of retention-level waste was discharged to the 300 Area pond. Average alpha analysis was less than 4.5×10^{-7} uc/ml. Average beta analysis was less than 8.0×10^{-7} uc/ml.

Decontamination personnel made three trips to the 300 North Burial Ground with hot waste from the 327 Building. Readings on the waste were as high as 15 r at 10 feet.

All other decontamination, building services, and laundry functions were completed in a routine manner.

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CHEMICAL DEVELOPMENT SUB-SECTIONHOT SEMIWORKS

Decontamination. During the month, A Cell flushing reduced the Beckman readings by a factor of 9 (1800 mr to 200 mr). The badly pitted concrete and paint has been a major problem and source of radiation. Samples of contaminated paint were submitted to Process Chemistry and the recommended 6 molar nitric acid and 10 per cent sodium dichromate flush has shown some success in removing floor contamination.

Purex Waste Self-Concentration Performance. The waste self-concentrator tank has been maintained at approximately 15 ft. liquid level since June 20, 1956. The condensate has been collected in 125-150 liter batches, sampled, and drained back to the concentrator. At the start of the total reflux test, the waste had been concentrated to approximately 35 per cent of the volume originally charged to the tank. Due to failure of the vapor header heaters, condensate flow has occurred only when the tank contents "bumped". During periods of normal boiling, all vapor has condensed in the vapor header and refluxed back to the concentrator. Vapor from the tank passes through a 1/2-in. and/or 1-in. (1-1/2-in. valve with 1-in. reduced plug and seat) valve before being condensed.

The constant liquid level study was divided into two distinct periods of operation. During the first period (June 20 to July 30) the waste self-concentrator was operated with the 1-in. vapor valve open and the 1/2-in. valve closed. No consistent pattern was established by the "bumps" but some characteristic observations are as follows:

- a. The maximum pressure ranged from 2 to 17 inches of water with an average pressure of 10 inches.
- b. The pressure duration varied from 10 to 30 minutes with an average duration of 20 minutes.
- c. Maximum condensate rate (based on volume change in condensate catch tank) varied from 30-115 lb./hr. with an average rate of 90 lb./hr.
- d. The condensate collected per "bump" varied from 15 to 60 pounds with an average value of 45 pounds.

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- g. Seven hundred liters of condensate were collected during this period.

During the second period of operation (July 31 to August 28) at constant liquid level, the waste self-concentrator was operated with the 1/2-in. vapor valve open and the 1-in. valve closed. The "bumps", which generally occurred at 35-40 hr. intervals, had the following characteristics:

- a. The maximum pressure ranged from 2 to 13 in. of water with an average pressure of 9 in. water.
- b. The pressure duration varied from 185 to 255 minutes with an average duration of 200 minutes. The pressure generally remained at 75 to 100% of the maximum for 50 to 90 minutes.
- c. Maximum condensate rate (based on rotameter readings) ranged from 5 to 20 pounds per hour with an average maximum condensate rate of 14 lb./hr.
- d. The condensate collected per "bump" varied from 30 to 50 pounds with an average value of 45 pounds.
- e. The previously described temperature pattern existed also during the 1/2-in. valve studies. During a "bump", however, only a 5-10°F. temperature decrease (as compared to a 20-25°F. change for the 1-in. valve) occurred at the 2.5 and 3.5 ft. levels. The liquid temperature in the 4.75-ft. to 8.5 ft. level dropped to 230-235°F.
- f. Four hundred liters of condensate were collected during this period.

PUREX DEVELOPMENT

Process Chemistry

Organic from Purex L-Cell. A sample of "red oil" obtained during flushing of the Purex L-cell equipment was studied in the laboratory. The oil was thought to be associated with a line plug which formed between the concentrator and the receiver tank. It had a specific gravity of 1.35 and contained about 150, 40, and 800 g./l. of Pu, U, and dibutyl phosphate respectively. The remainder was presumably tributyl phosphate and diluent degradation products. The oil was neither dispersed nor dissolved by concentrated or dilute HNO_3 , FeSO_4 solution, or acidic dichromate solution. Acetone, methanol, and tributyl phosphate dissolved it completely; diluent (Shell E-2342) dispersed it but did not dissolve it. Sodium hydroxide, at concentrations between one and 25 per cent produced a fine dispersion with the oil; at concentrations above 25 per cent, a gray-green precipitate was formed. Twenty per cent Na_2CO_3 dissolved the oil completely although some precipitation occurred when the solution stood overnight. Lower concentrations of Na_2CO_3 dispersed the oil but did not dissolve it. All of the above tests were made at 25°C.

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Batch contacts simulating Purex HA and HC Columns were made in which Purex 1AF containing 1000 ppm "red oil" served as feed and laboratory solvent as extractant. As expected, considering the composition of the oil, Pu loss to the HCW increased from 0.03 per cent in a control run to 1.5 when the feed contained the "red oil". Similarly, gross gamma decontamination through extraction and scrub contacts was reduced from 590 in the control run to 31 in the spiked feed run. After the solvent from the spiked run was carbonate washed, it had a "C" contact value of 0.07 showing definite reduction in quality. Strip column DF was not affected by the presence of the "red oil".

Purex Decontamination Studies. Simple batch contacts (one extraction and six or eight scrubs) were made to study the effect of feed filtration and the presence of Versene in feed and scrub on decontamination. In one series of runs synthetic HAF spiked with two per cent Redox dissolver solution served as feed. In a second series, full level Redox dissolver solution, adjusted to HAF composition, was used as feed. Pertinent experimental conditions, and gamma decontamination factors obtained follow.

PUREX HA DECONTAMINATION

Run	Experimental Conditions	Extraction	Accumulated Gamma DF			
			Scrub Contacts			
			1	3	6	8
A	Control. 2% Spike	74	780	1.6×10^4	4.2×10^4	--
B	As A. HAF passed through Filtrol as filter ⁽¹⁾	206	1170	1.6×10^4	4.2×10^4	--
C	As A. HAF and HAS made 0.001 M in tetrasodium Versene	594	5100	2.8×10^4	4.8×10^4	--
D	Control. Full level HAF. (Redox source)	5	19	4800	7.8×10^4	6.1×10^5 (2)
E	As D. HAF passed ⁽¹⁾ through 5 micron sintered S.S. filter	8	73	5200	3.4×10^4	2.0×10^5 (2)
F	As D. HAF and HAS made 0.001 M in tetrasodium Versene	352	2400	2.1×10^4	5.9×10^4	--

Notes: (1) Filtration DF's were 2.7 for the two per cent feed and 1.4 for the full level feed.

(2) Water used as scrub solution. All other scrubs 3M HNO₃.

While filtration and the presence of Versene resulted in higher accumulative decontamination factors for the extraction and first scrub contacts, their effect was almost completely eliminated by exhaustive scrubbing. Gamma activity in the final organic solutions was, in all cases, greater than 80 per cent Zr-Nb. The low extraction stage decontamination factors observed for full level feed without Versene have not been explained. During runs with unfiltered feeds, considerable radioactive material (presumably solids) adhered to the equipment after the solutions were removed; this did not occur with the filtered feeds.

Purex Waste Rework

Recent plant difficulties with rework of off-standard wastes for recovery of Pu prompted a reinvestigation of the rate of hydrolysis of DBP and TBP in these wastes as a function of refluxing time. Batch contacts simulating the HC Column showed that as little as 15 ppm of DBP in the solvent caused significant retention of Pu in the organic after exhaustive stripping.

To study TBP and DBP hydrolysis rates, simulated LW (8M HNO_3) solutions were spiked with TBP and held at elevated temperature (100 and 105°C.). DBP in the aqueous phase was determined quantitatively (Brite method) as a function of time. Enough TBP (19.45 g./l. of LW) was added to form a second phase since it is suspected that a two-phase system may exist in the waste receiving tanks.

In the solution held at 105°C. the concentration of DBP in the aqueous phase rose rapidly (within five hours) to about three grams per liter and remained at that value for about 20 hours. From then on the concentration decreased in agreement with a first order rate equation in which K is 0.17 hr.^{-1} ($T/2 = 4.2 \text{ hr.}$).

The aqueous DBP concentration pattern for the sample held at 100°C. was similar to that for the sample held at 105°C. but with a longer time at constant concentration (ca. 60 hr.) and a K for the first order portion of 0.131 hr.^{-1} ($T/2 = 5.3 \text{ hr.}$). Further confirmation of the marked effect of solution temperature on rate of DBP hydrolysis was shown by a series of experiments in which 8 M HNO_3 solutions containing two g./l. DBP were simmered at various temperatures and DBP content was followed as a function of time. Half-life values increased almost linearly from about 1.8 hr. at 110°C. to 9.4 hr. at 90°C.

These data show the expected rapid conversion of TBP to DBP and the slower hydrolysis of the DBP. Obviously the total time required to reduce the DBP concentration to an acceptable level will depend on the initial amount of TBP present and the temperature maintained. In the experiment at 105°C. in which the initial TBP content was about two volume per cent, a total of nearly 120 hr. would be required to reduce DBP concentration to 15 ppm.

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Chemical Engineering DevelopmentSolvent Extraction Studies

10 Column. Since the start-up of the Purex Plant, the operation of the 10 Column has not been fully satisfactory. The organic decontamination across the column has been inadequate and the column frequently floods. To dissipate a flood it has been necessary to shut off the scrub flow for as long as 2-1/2 hours. Studies have been initiated to develop an improved cartridge for the 10 Column or to define better operating conditions for the present cartridge (stainless steel nozzle plates, 10 per cent free area, 1/8-inch holes, 4-inch plate spacing, 0.035-in.-deep nozzles pointed downward).

Thirty-five "cold" 10 Column flooding runs were made during the month in a 3-in.-diameter glass column with a 21-ft.-high cartridge. Purex HW No. 3 Flowsheet was used with the influent streams both at the ambient temperature or heated to 50°C. The cartridges tested were:

1. Stainless steel nozzle plates
2. Fluorothene plates
3. Stainless steel Raschig rings
4. Fluorothene Raschig rings
5. Stainless steel louver plates

Cartridge details and flooding conditions are described in Table I. Highlights of the findings are summarized below:

1. The nozzle plate and the fluorothene plate cartridges operating at the ambient temperature gave essentially the same flooding curves as shown in the Purex Technical Manual (HW-31000).
2. Unlike the A-type scrub column, the cleanliness or wettability of the stainless steel nozzle plates has little or no effect on the flooding frequency.
3. With the influent streams heated to 50°C., the flooding volume velocities of the various cartridges were up to 30 per cent higher than those measured with the unheated influent streams.
4. Once a flood developed in an unheated nozzle plate run, it was necessary to shut down the column to dissipate the flood. Removal of all the aqueous holdup in the column was necessary to prevent immediate reflooding of the column upon restarting.
5. A reduction in frequency or volume velocity was sufficient to dissipate a flood in the heated nozzle plate runs and in the heated or unheated runs made with the other cartridges.
6. The same flooding capacity factor (3.75 ± 0.25) was measured in heated runs with the fluorothene plates, fluorothene Raschig rings and louver plates at a frequency of 60 cycles per minute.

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7. At an organic rate corresponding to a capacity factor of 1.44, the flooding scrub rates for the cartridges tested were generally higher at 50°C. than at 25°C.
8. The column packed with stainless steel Raschig rings was inoperable with the organic phase continuous at rates equivalent to a 1.44 capacity factor. However, the column was operable with the aqueous phase continuous.

In the studies made to date, it appears that with a heated column both fluoroethene and louver plates exhibit: (1) as high a flooding volume velocity, (2) more uniform dispersion, and (3) better operability characteristics than stainless steel nozzle plates.

Scrub Section Plate Cleaning. The capacity and efficiency of the A-type column scrub section are affected by the degree of organic wettability of the stainless steel plates which is controlled to some extent by the dirtiness of the plates. An experimental program was undertaken to devise an adequate but simple method of cleaning plates.

The experimental procedure consisted of washing the plates and then determining the direction of the meniscus when the plates were inserted in a beaker containing both an aqueous and an organic phase. Plates were used directly from storage and were also artificially dirtied by dipping in organic and drying and by smearing with a lubricating oil.

Hilco cleaner, Na_3PO_4 , NaOH , Na_2CO_3 , and HNO_3 solutions were used as cleaners. Of these, Na_2CO_3 proved to be the most effective. When used with plates taken from storage or coated with dried organic, the Na_2CO_3 cleaned the plates sufficiently to give a meniscus consistently pointing into the organic phase. When used on plates smeared with lubricating oil, the cleaning was not effective consistently.

When cleaned with any of the other solutions, the plates tended to be wet by the last phase with which they had contact; i.e., the menisci pointed into the aqueous phase when the plates were moved from the organic layer into the aqueous and pointed into the organic phase when moved from the aqueous layer into the organic. Hilco cleaner and Na_3PO_4 , however, were found to be more effective in removing gross quantities of oil and dirt from the plate surfaces than was Na_2CO_3 .

Pulsed Spray Column. To determine the applicability of a pulsed spray column to the Purex Plant solvent cleanup system, studies were undertaken in a 12-ft.-high, 1-in.-diameter column. Twenty runs were made using 30% TBP in Shell E-2342 diluent as the solvent, 2.5% sodium carbonate as the aqueous phase, and an L/V (aqueous-to-organic flow ratio) of approximately 0.33. Flooding characteristics were determined for organic continuous operation with the following:

1. Empty column.
2. Four stainless steel sieve plates with 1/16-in.-diameter holes and 23% free area located 1, 4, 7, and 10 feet from the bottom of the column.
3. Four stainless steel nozzle plates having 1/8-in.-diameter holes and 23% free area, located as above.

The flooding data are summarized in the following table:

PULSED COLUMN FLOODING STUDIES - PUREX IO SYSTEM

Equipment: 12-ft. length of 1-in.-diameter glass column
Continuous phase: Organic
L/V: 0.33 to 0.45

<u>Cartridge (a)</u>	<u>Purex Plant Capacity Factor</u>	<u>Pulse Amplitude, In.</u>	<u>Flooding Frequency, Cycles/Min.</u>
A	1.2	0.5	463 ± 12
A	2.4	0.5	425 ± 25
A	1.2	1.5	312 ± 12
A	2.4	1.5	312 ± 12
B	1.2	0.5	412 ± 12
B	2.4	0.5	288 ± 12
B	1.2	1.5	188 ± 12
B	2.4	1.5	90 ± 10
C	1.2	0.5	263 ± 12
C	2.4	0.5	238 ± 12
C	1.2	1.5	113 ± 12

Note: (a) A = empty column.
B = four 23% free area sieve plates 1, 4, 7, and 10 ft. from bottom.
C = four 23% free area nozzle plates 1, 4, 7, and 10 ft. from bottom.

It appears that in the ranges studied an empty column flooding frequency is influenced by pulse amplitude but not by volume velocity. With the columns containing plates, both amplitude and volume velocity influence flooding frequency.

Continuous Ion Exchange. An efficiency run in the 5-in.-diameter Higgins-type continuous ion exchange unit was made utilizing 1.2 g./l. Fe^{+++} in 0.5 M HNO_3 as feed and 5 M HNO_3 as strip solution. Extraction column waste loss was less than 0.1%, and a five-fold concentration with essentially complete recovery was achieved. Preliminary calculations indicate an H.T.U. of nine inches in the extraction column and nine inches in the stripping column.

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Take-off collectors consisting of cylinders of porous stainless steel (35 microns mean pore diameter) normal to the resin flow were demonstrated to be satisfactory from the standpoint of resin movement and low pressure drop for liquid removal.

Two varieties of influent stream distributors were tested and shown to be satisfactory.

Coalescer Studies. A coalescer scaled down from the design proposed for installation in the Purex Plant HAP and IAP streams for solids and aqueous deentrainment was constructed. The unit consists of a horizontal length of 4-in.-diameter glass pipe with provision for 18 in. of packing at the inlet to effect coalescence followed by an 18-in. section containing horizontal stainless steel baffle plates to effect settling of the coalesced aqueous phase.

The unit was installed in the 100 stream, leaving a 3-in.-diameter glass 10 Column for preliminary scouting studies. Efficiencies of the packings were determined by both visual observation and laboratory analyses of the entrained aqueous in the influent and effluent streams. The lower limit of detection of entrained aqueous was 0.05%.

Details of the packings tested and the experimental results are given in Table II. It appears that coalescence can be effected in the unit if packing of small fiber size and/or large surface area is used. To date, the baffle plates have not been shown to serve any useful purpose.

TABLE I

PUREX 3-IN. 10 COLUMN FLOODING STUDIES

Flowsheet: Purex HW No. 3. U, Pu, and F.P.'s omitted. Diluent: Shell E-2342.
Equipment: 3-in.-diameter precision bore glass column with a 21-ft. cartridge as described in the notes.

Continuous Phase: Organic

Run No.	Cart- ridge	Volume Velocity, Gal./ (Hr.) (Sq.Ft.), Sum of Both Phases	L/V Aqueous Organic Vol. Flow Ratio	Pulse		Temp., °C.
				Ampl., In.	Freq., Cyc./Min.	
3-84-OH	(a)	635	0.334	0.65	75 ± 5	25(f)
3-85-OH	(a)	770 ± 30	0.615 ± 0.056	0.65	70	25(g)
3-86-OH	(a)	635	0.327	0.65	75 ± 2	25(f)
3-87-OH	(a)	615	0.318	0.65	70 ± 10	25(f)(g)
3-88-OH	(a)	630	0.353	0.65	85 ± 5	50(h)
3-89-OH	(a)	675 ± 35	0.45 ± 0.07	0.65	80	50
3-90-OH	(a)	875	0.325	0.65	65 ± 5	25(f)
3-91-OH	(a)	870	0.330	0.65	82 ± 2	50(h)
3-92-OH	(b)	630	0.349	0.5	92 ± 2	25
3-93-OH	(b)	885	0.328	0.5	72 ± 2	25
3-94-OH	(b)	1185 ± 60	0.340	0.5	60	25
3-95-OH	(b)	690 ± 25	0.456 ± 0.049	0.5	80	25
3-96-OH	(b)	630	0.324	0.5	102 ± 2	50
3-97-OH	(b)	875	0.338	0.5	92 ± 2	50(1)
3-98-OH	(b)	885 ± 25	0.860 ± 0.065	0.5	90	50
3-99-OH	(b)	1650 ± 150	0.33	0.5	60	50
3-100-OH	(c)	635	0.33	0.5	0, 40, 60	25, 50(j)
3-101-OH	(c)	635	0.35	0.5	85 ± 5	25(k)
3-102a-OH	(c)	900 ± 100	0.28	0.5	60	25(k)
3-102b-OH	(c)	1060 ± 60	0.31	0.5	40	25(k)(1)
3-103-OH	(d)	640	0.344	0.5	95 ± 5	25(h)
3-104-OH	(d)	690 ± 20	0.455 ± 0.040	0.5	90	25
3-105-OH	(d)	1340 ± 60	0.33	0.5	60	25
3-106-OH	(d)	640	0.332	0.5	112 ± 2	50
3-107-OH	(d)	850	0.79	0.5	95 ± 10	50
3-108-OH	(d)	1690 ± 40	0.295	0.5	60	50
3-109-OH	(e)	635	0.330	0.5	85 ± 2	25(m)
3-110-OH	(e)	875	0.325	0.5	72 ± 2	25(n)
3-111a-OH	(e)	1090 ± 70	0.318	0.5	60	25
3-111b-OH	(e)	1460 ± 50	0.324	0.5	50	25
3-112-OH	(e)	755 ± 20	0.598 ± 0.040	0.5	75	25
3-113-OH	(e)	635	0.331	0.5	85 ± 5	50(o)
3-114-OH	(e)	885	0.332	0.5	82 ± 2	50
3-115-OH	(e)	1640 ± 20	0.326	0.5	60	50
3-116-OH	(e)	870 ± 20	0.868 ± 0.038	0.5	75	50

Notes: See following page.

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TABLE I (Cont'd)

Notes:

- (a) Stainless steel nozzle plates, 1/8-inch holes, 10% free area, 0.04-inch deep nozzles pointed downward, 4-in. plate spacing.
- (b) Fluorothene plates, 3/16-inch holes, 23% free area, 4-inch plate spacing.
- (c) Packed column with 1-inch stainless steel Raschig rings.
- (d) Packed column with 1-inch fluorothene Raschig rings.
- (e) Stainless steel louver plates, 25% free area, 4-inch plate spacing.
- (f) Reducing frequency did not break flood.
- (g) Plates "dirtied" by allowing to stand in an empty column for two days.
- (h) Flood broke when the frequency was reduced to 80 cyc./min.
- (i) Flood broke when the frequency was reduced to 85 cyc./min.
- (j) Column inoperable under all conditions listed.
- (k) Column operated with the aqueous phase continuous.
- (l) Shutting off the pulse generator did not break the flood.
- (m) Flood did not break when the frequency was reduced to 80 cyc./min., but did break when the frequency was reduced to 75 cyc./min.
- (n) Flood broke when the frequency was reduced to 70 cyc./min.
- (o) Flood did not break when the frequency was reduced to 85 cyc./min., but did break when the frequency was reduced to 80 cyc./min.

TABLE II

PUREX LIQUID-LIQUID DEENTRAINMENT STUDIES

Equipment: See Note (a)

<u>Coalescer Packing</u>	<u>Packed Density, Lb./Cu.Ft.</u>	<u>Throughput, Gal./(Hr.)(Sq.Ft.)</u>	<u>Pressure Drop In. H₂O</u>	<u>Visual Observation^(b)</u>
York Mesh, 0.005-in.-diam. stainless steel wire	13.7	280 to 700	< 0.5	No coalescence
York Mesh, 0.01-in.-diam. stainless steel wire	9.0	280 to 790	< 0.5	No coalescence
Steel Wool, Grade 0 ~0.002-in.-diam. wire	11.5	280 to 580	1.0	Complete coalescence
Steel Wool, Grade 3 ~0.01-in.-diam. wire	9.5	280 to 700	< 0.5	Little coalescence
Glass Wool, dense packed	7.7	390	40	Good coalescence
Glass Wool, loose packed	4.6	810	47	Good coalescence
York Mesh, combination stainless steel and fiber glass	8.5	280 to 580	< 0.5	No coalescence
Raschig Rings, 1/4-in. stainless steel	(c)	280 to 810	< 0.5	Very little coalescence
100-mesh stainless steel screen on 1-in. spacing. Alternate spaces packed with glass wool.	--	280 to 700	4	Moderate coalescence

Notes:

(a) 4-in.-diameter standard bore glass pipe horizontal coalescer 46-in.-long. The internals of the coalescer consisted of: (1) 3-in.-long entrance section; (2) 18-in. of coalescer packing as indicated in the table; (3) 3-in. void section; (4) three 18-in.-long horizontal stainless steel baffle plates, spaced 1-in. apart, extending the full width of the coalescer; and (5) 4-in. void exit section. The effluent organic overflow was placed at a height to cause the coalescer to operate approximately 3/4 full. The aqueous effluent was continuously removed through an adjustable jack leg which maintained the aqueous-organic interface at or near the bottom of the coalescer. The coalescer was placed in the organic effluent line of a 3-in.-diameter 10 Column.

(b) Estimate of the effectiveness of the coalescer packing by observation of the relative cloudiness of the influent and effluent streams arising from entrained aqueous.

(c) Void volume of 74 per cent.

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URANIUM RECOVERY DEVELOPMENT

Process Chemistry

Reduction of UO_3 with Ammonia. The following table summarizes thermobalance studies of the effect of ammonia reduction of UO_3 to UO_2 on hydrofluorination of the UO_2 .

HYDROFLUORINATION OF UO_2 PREPARED BY AMMONIA
AND HYDROGEN REDUCTION OF UO_3

<u>Powder</u>	<u>Reductant</u>	<u>Temp. of Reduction °C.</u>	<u>Temp. of Hydrofluorination, °C.</u>	<u>Time for 98% Conversion to UF_4, Min.</u>
HAPO Pot	H_2	925	600	42
HAPO Pot	H_2	925	500	39
HAPO Pot	H_2	925	400	40
HAPO Pot	NH_3	925	600	26
HAPO Pot	NH_3	925	500	23
HAPO Pot	NH_3	925	400	11
321 Bldg. Cont.	H_2	925	600	90
321 Bldg. Cont.	H_2	925	500	72
321 Bldg. Cont.	H_2	925	400	40
321 Bldg. Cont.	NH_3	925	600	102
321 Bldg. Cont.	NH_3	925	500	68
321 Bldg. Cont.	NH_3	925	400	34
HAPO Pot	H_2	590	600	38
HAPO Pot	H_2	590	500	36
HAPO Pot	H_2	590	400	60
321 Bldg. Cont.	H_2	590	600	114
321 Bldg. Cont.	H_2	590	500	114
321 Bldg. Cont.	H_2	590	400	130
321 Bldg. Cont.	NH_3	590	600	45
321 Bldg. Cont.	NH_3	590	500	20
321 Bldg. Cont.	NH_3	590	400	52

Brown oxides (UO_2) produced by ammonia reduction at 925°C. of HAPO pot UO_3 hydrofluorinated more rapidly than UO_2 obtained by hydrogen reduction at 925°C. Brown oxides prepared by reduction at 925°C. of 321 Bldg. continuously produced UO_3 had about the same hydrofluorination rate whether reduced with ammonia or hydrogen.

When continuously produced UO_3 was reduced at low temperature (590°C.), the UO_2 prepared by ammonia reduction hydrofluorinated much more rapidly than that prepared by hydrogen reduction.

DECLASSIFIEDWASTE TREATMENTProcess Chemistry

Plant Test of Modified Scavenging Procedure. Favorable laboratory results led to a plant test of a modified scavenging procedure in which inert cobalt was added at two separate points, one prior to ferrocyanide addition (actually in RDIS) and one with nickel immediately before neutralization. Co^{60} content of grab samples (WRO02) of the scavenged waste during the test averaged about 2×10^{-4} uc/ml., a factor of three lower than for samples taken immediately before the test and higher than 0.1 M PC by a factor of five. Co^{60} analyses on supernatant liquid from the settling tank are not yet available.

Adsorption of Cobalt on an Anion Exchange Resin. Reported strong adsorption of the hexacyanocobalt (III) ion on anion exchange resins suggested such resins as means to obtain additional Co^{60} decontamination in waste solutions. Permutit S-1 (a strong-base anion exchanger) readily adsorbed $\text{Co}(\text{CN})_6^{3-}$ from a low-salt solution. However, little or no adsorption occurred when the complex was present in a synthetic stored waste (high salt). Also, when actual stored waste was made 0.005 M in KCN and digested 30 min. (in an attempt to convert any cobalt present to the cyano complex), cobalt was not effectively removed by the resin during batch contacts at pH's from one to nine. When a stored waste which had already been scavenged with nickel ferrocyanide and strontium nitrate was contacted with the resin about 50 per cent of the cobalt present was removed if the waste was first brought to pH's from one to six. Cobalt removal was considerably less at pH 8.

Further attempts to remove Co^{60} from stored wastes by scavenging with nickel or cobalt cobalticyanides and with cobaltamine ferrocyanides have been unsuccessful.

Scavenging of Co^{60} from stored wastes by inert cobalt sulfide, as discussed in the July report, remains the most promising procedure yet found for treating these wastes. An economic evaluation of the procedure is being made by Plant Processes personnel. Further laboratory work has been aimed at determining optimum conditions and reproducibility of results.

MISCELLANEOUS DEVELOPMENTSeparations Equipment DevelopmentIn-Line Instrument Development

Continuous Ion Exchange Column Controls. Preliminary tests with a H.A.P.O. type gamma absorptometer indicate inadequate sensitivity for determining the plutonium concentration on the resin bed. However, based on information available, the Ohmart dual ion chamber type instrument appears to have sufficient sensitivity for this determination. An Ohmart unit is being purchased for test and evaluation. Development and testing of a conductivity probe for (elutriate) acid-water interface control is continuing. Similar probes for measuring the resin-water interface have performed satisfactorily in laboratory tests.

Remote Sample Flow Indicator. The Brooks flo-gard (remote indicating flowmeter; flow-no-flow) was tested with 300 feet of RG62/V cable, and found to operate satisfactorily. It has been recommended for plant use where remote indication of sample flow is deemed necessary.

Technical Specifications. The technical specifications for in-line pH monitors (HW-44917) were issued this month.

Plant Assistance. The plutonium gamma absorptometer at Purex was returned to service during the last plant shutdown. Unfortunately it is not possible to be certain of the cause of the failure reported last month. It was assumed that the maintenance work on the valve downstream of the absorptometer had caused the source to shift the collimated gamma beam so that it missed the chamber window. A shift of $7-1/2^\circ$ would have caused this. It was not possible to feel a shift of this magnitude under conditions that prevailed during maintenance. Moreover, measurement of the signal cable resistance to ground indicated a low value (approximately 40 megohms) at the time of failure. Measurement after service was resumed indicated a satisfactory (1000 megohms) resistance to ground.

A new thulium-170 source was installed in the Recuplex plutonium gamma absorptometer. Calibration data to date do not agree consistently with the laboratory results. Additional work on recalibration is expected.

The Purex prototype iodine-131 gamma scintillation monitor failed to operate satisfactorily when the differential analyzer failed. A new differential analyzer was installed, the unit was in operation at month's end.

Mechanical Equipment

Plug-Piston Pulse Generator. Water loss from a 3-inch-diameter column has continued to be less than 5 ml./hr. during pulsing by a 4-inch-diameter graphite plug-piston. Total cycles on the pulser components (120 cycles/min., 1/2 to one inch stroke) are:

- (1) Piston and cylinder - 19 million
- (2) 17-4 PH stainless steel piston rod - 9.5 million
- (3) Polypenco K-51 Throttle bushing - 9.5 million
- (4) Teflon chevron packing - 16.5 million

Inspection No. 3, at 15.5 million cycles on the piston, showed no piston rod corrosion and no appreciable piston wear, since the previous inspection (13 million cycles).

Piston leakage rates of 1000 ml./hr. developed during a test with the air purge line connected between the piston and the throttle bushing. The air purge is normally connected between the chevron packing and throttle bushing.

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A 4-inch-diameter graphite plug-piston pulser has accumulated 7 million cycles pulsing water in the Hot Semiworks 10 Column, without measurable leakage during normal operation. Leakage rates up to 100 ml./hr. developed when the air supply was shut off, but returned to normal when air flow was reestablished. The 5 million cycle inspection revealed eccentric wear of the piston on the lower end (2 mils vs. 5 mils wear on diametral axis) and heavy scoring of the piston rod by the spring-loaded Teflon chevron packing.

Slug Handling. Installation of a reciprocating-tube slug feeder and hopper in 321 Building was completed, and operating trials (without slugs) started. The hopper will be charged with slugs now available in 321 Building during the coming month.

Prototype Calciner Shaft Seals (224-U Building). Service life of conventional shaft packing (Durametalllic D-10, Johns-Manville No. 392) in the drive end gland housing has varied from 10 to 70 hours during current operation of the prototype calciner. Outboard (discharge) end packing has been relatively troublefree. Both housings deflect with reference to the shaft due to shell warpage. The biggest apparent difference lies in the solid coupling which attaches the drive end stub shaft to the agitator, and may transmit agitator shock loading to the stub shaft as deflection. Four approaches to this problem are being considered currently:

- (1) Cone-shaped gland followers to more effectively squeeze the packing into the shaft.
- (2) Brass wool packing.
- (3) Labyrinth-type packing rings machined from bronze to replace all or part of the conventional packing.
- (4) Wholly mechanical seals with spring-loaded, hard-faced wear rings as seals.

Approach (3) is scheduled for first installation, with (1), (2), and (4) to follow as the need is demonstrated, and materials become available.

Miscellaneous

Slug Jacket Removal by Pyrometallurgy. The facilities of the Fuel Element Development Unit in 306 Building were used in a preliminary approach to removal of aluminum slug jackets by pyrometallurgical methods. Three jacketed slugs were placed in a high frequency induction coil (50 KW, 10 KC) and heated until melting of the jacket occurred. Considerable "dross" was formed, as well as Al-U compounds on the slug surface. Results indicate that higher power and frequency would be desirable for further work.

A fourth jacketed slug immersed in an Al-Si molten bath (approximate temperature - 635°C.) for 65 seconds was stripped clean of its jacket, leaving a coating of Al-Si on the slug. Problems of operating such a bath in remote zone are under consideration.

Titanium Testing. Commercially pure titanium has been boiled in uranyl nitrate - nitric acid mixtures for over 600 hours. No significant change in weight has occurred and the metal surface has remained bright except for thin spotty white-to-gray discoloration. No pyrophoricity has been noted at any time.

The titanium on test is a steam heated bayonet-type heating element used to boil the various solutions. This element has been subjected to the following conditions:

- (1) 385 hours of boiling in an essentially neutral solution of UNH ranging from 400 to 900 g./l. uranium.
- (2) 155 hours of boiling in a UNH - HNO_3 solution containing 200 g./l. uranium and 420 g./l. (~35%) HNO_3 .
- (3) 75 hours of boiling in a UNH - HNO_3 solution containing 360 g./l. uranium and 655 g./l. (~50%) HNO_3 .

Chemical Compatibility Tests. Johns-Manville "Velseal" caulking compound was tested for resistance to various solutions at room temperature. All tests were terminated after nine days. The material proved unsatisfactory for application where Separations Plant solvents may be encountered. The test results are tabulated below:

<u>Solution</u>	<u>Results and Remarks</u>
60% Nitric Acid	Lost adhesion. No other effect noted.
50% Caustic Soda	Adhered well. No visible effect.
30% TBP-Soltrol	One day - swelled. Two days - dissolving. Nine days - softened badly. Completely dissolved below liquid level.
CAX	One day - failed completely. Dissolved.
Hexone	One day - swelled 5%. Two days - swelled 10%. Nine days - became very soft, swelled, lost adhesion.
Distilled Water	Lost Adhesion.

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Polypenco K-51 was tested in boiling solutions of nitric acid and pure water for 24-hour periods. In distilled water, 10% nitric acid and 20% nitric acid this material did not change in weight significantly nor did it soften as indicated by Shore Sclerescope hardness. There was less than 0.1% change in weight by the samples. In 40% nitric acid there was no significant change for 4 hours. After 24 hours the sample had decreased in weight by 7% and softened noticeably. In 60% nitric acid the material lost 5% in weight and softened noticeably after 4 hours. Twenty-four hours of exposure to this solution caused a 40% reduction in weight and the loss of strength. The material broke readily in the fingers. The degradation of this material was accompanied by a whitening. The whitened material was quite friable.

The same test was run using a solution of 420 g./l. UNH, 10 g./l. nitric acid. The sample showed no change in weight or hardness.

ANALYTICAL LABORATORIES UNITGeneral Chemical

Total uranium analysis was completed for the nine Savannah River slugs (95% aluminum - 5% uranium) mentioned last month. Average precision was $\pm 0.9\%$, 95% CL. The method showed a 0.1% error. Slug wafers continued to dissolve from the center toward the circumference. Optimum dissolution was achieved simply with concentrated hydrochloric acid. Past HAPO effort had indicated smoothest dissolution with hydrochloric acid containing bromine oxidant. Omission of oxidizing agent also simplified the final ceric sulfate titration which requires quadrivalent uranium. Error of the method was estimated by preparing and analyzing a simulated slug solution with the source of uranium being spectrographically pure U_3O_8 .

A spectral energy recording attachment (SERA) was installed on the Beckman DU flame photometer. Important wave length regions of unknowns may be scanned and recorded. Scans can be accomplished in 1 to 100 minutes depending upon requirements. After suitable calibrations a variety of metal ions occurring simultaneously and some anions may be detected and estimated from position and height of characteristic wave length peaks. For example 0.05% copper was readily detected and measured in dissolved steel.

The laboratory is prepared to furnish analytical support to UO_3 prototype calciner studies.

Radiochemical

As an aid in defining pile exposure of selected Metallurgy Research Sub-Section specimens, uranium burn-up is being determined. Burn-up includes direct U-235 fission as well as U-238 consumption by way of Pu-239 and other fission. To insure adequate sampling, large pieces are being dissolved. Necessary shielding has been obtained through cooperative use of a Process Chemistry facility for a limited number of dissolutions. Metallurgy expects continued need for that service; therefore, plans are being made for establishing a suitable dissolving facility in the 325 Building.

Vacuum extraction determination of gases in metals continued. Expected intensity warranted transfer of that work to non-exempt status. Satisfactory non-exempt progress indicates that current close supervision can soon be relaxed.

Two of the five fission counter chambers have been calibrated and are being used to determine Pu-240 in accumulated samples. Standardization is proceeding for the remaining chambers.

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Spectrometry

Mass: All spectrometers were in operation two days after a scheduled 325 Building power outage. The uranium mass spectrometer sustained temporary loss of the sensitivity required for support of isotope enrichment studies. However, sensitivity was adequate for analyzing five (5) Manufacturing UO₃ samples.

Transfer of the GE spectrometer to Chemical Research has been delayed due to continued trouble with the IR spectrometer.

Emission: A final working curve is being prepared for determining 12 elements in water. Sensitivities will be 1 to 10 ppb. Some method change is required for reporting cobalt in KAPL-120 filter water.

Water Quality: The KE-KER Unit has released major use of the KER Chemical Laboratory for ALU modification. The laboratory will be used to supply analytical support for organic coolant studies.

Laboratories work volume statistics are as follows:

	JULY		AUGUST	
	<u>No. of</u> <u>Samples</u>	<u>No. of</u> <u>Determinations</u>	<u>No. of</u> <u>Samples</u>	<u>No. of</u> <u>Determinations</u>
<u>Research & Development</u>				
<u>Pile Technology</u>				
Physics Research	7	235	-	-
Metallurgy Research	5	91	45	149
Pile Materials	559	1549	436	1754
Pile Engineering	4	20	15	75
Fuel Technology	44	201	38	516
<u>Separations Technology</u>				
Plant Processes	5	71	17	303
Chemical Research	711	1101	1036	1738
Chemical Development	629	1189	366	1011
<u>Process Technology</u>	524	960	640	1434
<u>Other Customers</u>	106	457	138	817
Total	2594	5874	2731	7797

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TECHNICAL SHOPS UNIT -

Mechanical Shops

The influx of new work dropped to a low level the latter half of the month permitting some inroads to be made in the large backlog existing at the start of the month.

Overtime work required to complete urgent Projects amounted to 133 hours which is much lower than the average for the past year.

A total of 74 craftsmen was furnished by the Manufacturing Department which was within one of the desired complement. No unusual work or incidents occurred during the month and all demands for service were met in a satisfactory manner.

Buildings and Grounds

IR-200 Graphite Machining Facility

This work was completed and accepted during this period.

CA-685 Alterations of 325 and 326 Buildings

This project was approved by the AEC.

General

As part of the reorganization study, space allocations were determined. The resulting moves were coordinated and the landlord function was established for all of the Hanford Laboratory facilities.

Drafting and Design

Requests for service again exceeded the available supply of man power and considerable shifting of personnel was required to complete the more urgent projects. Personnel remained on loan from the Design Section and Graphics Unit and additional assistance was provided by these groups through the acceptance of jobs originally assigned to the Technical Shops. One termination occurred and no acceptable applications were received in reply to the personnel requisitions on file with the Employment Group.

Glass Shop

Total productive man hours for the month was 980 with 125 jobs being completed, 22 of which were fabricated from quartz. The work load continued moderate to light permitting excellent service to be rendered. Unusual jobs included a 3 stage vacuum bell jar equipped with an internal winch and hook which are operable from the outside of the jar.

Photo Laboratory

All requests for service were met promptly and the work completed by the desired date.

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CONTACT ENGINEERING UNIT

Operations proceeded routinely throughout the month.

INVENTIONS

All Separations Technology Section personnel engaged in work that might reasonably be expected to result in inventions or discoveries advise that, to the best of their knowledge and belief, no inventions or discoveries were made in the course of their work during August, 1956 except as listed below. Such persons further advise that, for the period therein covered by this report, notebook records, if any, kept in the course of their work have been examined for possible inventions or discoveries.

Inventor(s)

Title

Ko, Roy

The Preparation of Dilute Solutions for
Spectrographic Analysis

R. B. Richards

Manager, Separations Technology
ENGINEERING DEPARTMENT

RB Richards:khs

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HW-45115

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DESIGN SECTION

September 12, 1956

VISITORS AND BUSINESS TRIPS

F. B. Akerson of the Minneapolis-Honeywell Regulator Company, Portland, Oregon visited Hanford on August 2 for consultations concerning difficulties encountered in the use of several components of Minneapolis-Honeywell equipment.

I. R. Compton of Hawthorn Electronics, Portland, Oregon visited Hanford on August 15 and 16 for discussions concerning the operation of prototype analog to digital conversion equipment.

R. A. Paisley of Kaiser Aluminum Company, Spokane, Washington visited Hanford on August 21 for discussions concerning the use of aluminum foil in conjunction with in-line monitoring.

R. T. Coffman visited Battelle Memorial Institute, Columbus, Ohio and Bausch and Lomb Company, Rochester, New York on August 6 through 11 to obtain information regarding remote metallograph equipment.

O. H. Pilkey visited the Portland Cement Association, Chicago, Illinois on August 15 for discussions concerning the structural aspects of underground waste storage tank design.

E. S. Day, Jr. visited Wickes Boiler Company, Saginaw, Michigan on August 16 and 17 to obtain design information concerning boiler control methods.

O. W. Priebe visited W. C. Nickum and Sons, Seattle, Washington on August 17 to provide technical assistance to the Architect-Engineer in the design of silica gel tail-end treatment facilities for the Purex Plant.

M. T. Slind attended the West Coast Electronic show and convention of the Institute of Radio Engineers, and conferred with representatives of Consolidated Electrodynamics, Wiancko Company, Arnoux Company and Librascope Company to obtain information on flow monitoring and data recording equipment, in Los Angeles, California, August 20 through 24.

G. L. Locke, L. G. Henke and M. H. Russ visited Kaiser Engineers, Oakland, California on August 21 through 24 for orientation discussions with the Architect-Engineer concerning requirements for Project CG-654, Advance Design - Reactor Plant.

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ORGANIZATION AND PERSONNEL

Personnel Statistics:

	July 31			August 31		
	Exempt	Non-Exempt	Total	Exempt	Non-Exempt	Total
Design Management	2	1	3	2	1	3
Process Engineering Sub-Section	79	15	94	76	16	92
Design Planning Unit	20	14	34	20	14	34
Design Engineering Sub-Section	81	11	92	81	12	93
Design Drafting Unit	<u>7</u>	<u>73</u>	<u>80</u>	<u>7</u>	<u>73</u>	<u>80</u>
Total Section Personnel	189	114	303	186	116	302
Rotational Technical Graduates	--	<u>6</u>	<u>6</u>	--	<u>8</u>	<u>8</u>
Total	189	120	309	186	124	310

Accessions - 9

Separations - 8

GENERAL

Total engineering and drafting man months expended on Design Section managed projects and process technology increased during August, while effort on design development programs decreased. Total effort expended on customer work during the month was at essentially the same level as in July. Distribution of effort by major components for the month of August was as follows:

	Engineering Man Months Expended	Drafting Man Months Expended	% of Section Effort
Design Development Programs	64.2	4.2	27.4
Design Section Managed Projects	75.2	47.0	50.3
Advance Engineering - FY 1957 & FY 1958	4.5	0.4	2.0
Process Technology	3.7	1.3	2.1
Customer Work	<u>20.4</u>	<u>23.3</u>	<u>18.2</u>
Total	168.0*	76.2*	100.0

*Equivalent man months expended include 40 hours of engineering overtime and 32 hours of drafting overtime, which represents 1.4% of the Section based on the total available hours for a normal 40 hour week.

The Design Drafting Unit production for August was 181 new drawings and 275 drawing revisions for an equivalent of 6.1 man days per drawing.

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DESIGN DEVELOPMENT

The distribution of engineering and drafting man months applied to design development programs during August was as follows:

	<u>Engineering</u>		<u>Drafting</u>	
	<u>Man Months</u>	<u>% of Total</u>	<u>Man Months</u>	<u>% of Total</u>
Metallurgical Design Development	11.3	17.6	--	--
Reactor Design Development	28.1	43.7	1.1	26.2
Separations Design Development	18.7	29.2	1.2	28.6
Chemical Processing and Reduction	3.2	5.0	0.2	4.8
Design Development				
234-5 Design Development	<u>2.9</u>	<u>4.5</u>	<u>1.7</u>	<u>40.4</u>
Total	64.2	100.0	4.2	100.0

Metallurgical Design Development

Document HW-44853 was completed during August summarizing the results of studies, which have been made during the past 1-1/2 years, of the cost of fabricating various types of fuel elements. Twenty different types of fuel elements were studied, including solid individual elements and clusters of elements containing from 7 to 37 individual elements, with jacketing materials of aluminum, stainless steel, and zirconium. Average fabrication costs per square foot of fuel element surface area for the elements studied were: aluminum - \$12.96, stainless steel - \$17.28, and zirconium - \$28.80.

Work was in progress at the end of the month on a report which will summarize the results of studies of the 313 Building fume problem and contain recommendations for control of fumes from sources such as the pickling, penetration etch and slug recovery operations.

Other metallurgical design development activity during August included studies of the application of induction preheating units to slug, can and cap assembling equipment, and studies of the mechanization of present 313 Building operations.

Reactor Design Development

Document HW-44942, "A Preliminary Examination of a Helium Cooled Graphite Moderated Production Reactor Concept," was issued during August summarizing the results of the first stage of a study to determine the feasibility of a gas cooled reactor for the co-production of plutonium and electric power. The results of this study indicate that gas cooled reactors may be competitive with the water cooled Hanford type reactors.

Preliminary studies have been initiated of the design of a liquid moderated reactor. Investigations are being made of the relative complexity, cost and schedule characteristics, and operating capabilities of various types of liquid moderated reactor design concepts.

1102153

Work was initiated during the month on studies of the feasibility of recovering marketable amounts of electric power from an organic cooled reactor. Preliminary findings indicate that by using the maximum high temperature potential of an organic coolant, appreciable amounts of power may be recovered, and that power recovered from an organic cooled reactor would be competitive with power recovered from a conventional water cooled reactor.

Studies were continued during August to determine the modifications to the 100-K Area water plants which would be necessary to sustain a process water flow rate of 175,000 gpm. A report dealing with the estimated cost of these modifications and the degree to which the additional flow capacity could be utilized to increase production was in preparation at the end of the month.

Other reactor design development items which were active during August include studies of improvements to vertical safety rod system components in existing reactors, studies of the leakage problem at the 107-C Retention Basins, and evaluation of prototype temperature monitoring and flow monitoring system components.

Separations Design Development

Studies were continued during the month of building and equipment modifications which would be required to provide for a Phase IV capacity increase in the Redox Plant.

Document HW-45038, "Scope Design of Remote Equipment for Final Plutonium Product Concentration in the Purex Plant," was completed during August. The revised design presented in this document provides for remote replacement of individual equipment pieces to eliminate costly contact maintenance under hazardous conditions or disposal of the entire system due to failure of a single unit.

The scope basis for the use of UO_3 recovered nitric acid in the Redox and Purex Plants was completed during the month and issued in Document HW-44715.

Studies were continued during the month of the feasibility of using calcium nitrate as the salting agent in the Redox process in place of aluminum nitrate.

Other separations design development activity during August included continuation of studies of ion-exchange applications in the separations processes and initiation of studies to establish methods of preventing organic material from entering product concentration equipment in the Purex Plant.

Chemical Processing and Reduction Design Development

Document HW-44498, "Design Scope for the Revision of the Recuplex Facility," was completed and issued during August.

Scope studies were initiated during the month for the installation of a second button line in the RG line area.

Other chemical processing and reduction design development during the month included completion of a design for a prototype transfer can for use in place of plastic bags for inter-hood transfer of material.

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HW-45115

234-5 Design Development

Work was in progress at the end of the month on a report summarizing studies of equipment which could be utilized in the fabrication of new products at Hanford.

Other 234-5 design development activity during August included development of a prototype briquetting press, continuation of studies of methods of mechanically dejacketing coated pieces, and completion of development testing of prototype equipment for finishing and sizing coated pieces in the Final Inspection and Mating Facility. Document HW-44037, "Task VIII Improvements - Mating Room Mechanization," was issued during the month in connection with the latter item.

Engineering Standards and Materials Development

The following standards were completed during August:

New Standards

HWS-6105-S - Standard Specification for Wood Post Fence
J-3-5a - Flange Jack Bolt
J-4-1 - Beta-Gamma Hand and Shoe Counter

Design Guide

DG-400-I - Design Guide for Flow Restricting Orifices

PROJECTS, PROCESS TECHNOLOGY AND CUSTOMER WORK

Statistics:

Engineering and drafting effort of the Design Section on projects, process technology and customer work for August was distributed as follows:

	<u>Engineering</u>		<u>Drafting</u>	
	<u>Man Months</u>	<u>% of Total</u>	<u>Man Months</u>	<u>% of Total</u>
Reactor Plant Modifications for Increased Production	9.0	8.6	0.9	1.3
Advance Design - Reactor Plant	18.1	17.4	6.6	9.2
100-K Reactor Plants	3.0	2.9	0.4	0.5
Steam Driven Auxiliaries - 165-KE & KW	3.9	3.8	3.1	4.3
Continuous Charge-Discharge Equipment C Reactor	4.7	4.5	5.7	7.9
Fuel Element Pilot Plant - Semi Works	4.1	3.9	2.0	2.8
Purex Capacity Increase	4.3	4.2	4.6	6.4
Improved Task I & II Fac. - 234-5	3.9	3.8	4.0	5.6
Other Design Section Managed Projects	24.2	23.3	19.7	27.4
Advance Engineering - FY 1957 & 1958	4.5	4.3	0.4	0.5
Process Technology	3.7	3.6	1.3	1.8
Customer Work	<u>20.4</u>	<u>19.7</u>	<u>23.3</u>	<u>32.3</u>
Total	103.8	100.0	72.0	100.0

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CA-512 - 100-K Area Facilities

Design Section activity on Project CA-512 during August included completion of design revisions to the nozzles and gun barrels in the 1706-KER Recirculation Facilities for use with zirconium process tubes, and review of vendor drawings for the 105-K Gamma Water Monitoring System.

CA-513 - Purex Separations Facility

Detailed design for the provision of an additional remote crane for the Purex Plant, together with necessary building modifications to provide maintenance facilities for the new crane, advanced to 76% complete during the month.

CG-558 - Reactor Plant Modification for Increased Production

Design activity during August on Project CG-558 included minor design revisions to accommodate field conditions, and review of vendor drawings.

CG-638 - Alum Activated Silica Water Treatment Facilities - Phase II

Design of activated silica addition facilities for the 100 Areas was suspended in January pending a decision on the use of another additive (Separan) which is currently undergoing in-pile testing.

CG-642 - Design of Continuous Charge-Discharge Equipment - C Reactor

Detailed design of full-scale continuous charge-discharge equipment for C Reactor advanced to 65% complete during August.

CG-643 - Redox Capacity Increase - Phase III

During August, preparation of design scope for Redox Capacity Increase - Phase III was essentially completed, based on presently authorized work, with the submission to the Design Council of a Design Instruction covering control equipment.

CG-644 - Silica Gel Tail-End Treatment Facilities - Purex

Detailed design of silica gel tail-end treatment facilities for the Purex Plant was 95% complete at the end of August. Remaining design work on this project consists of a final review of the Architect-Engineer's final design package prior to submittal to HOO-AEC.

CG-653 - Modifications - Redox Cooling Water Disposal

Detailed design was completed during the month for facilities to provide for segregation and separate disposal of Redox process cooling water and steam condensates.

CG-654 - Advance Design - Reactor Plant

Work continued during the month on the preparation of a limited scope package for a new plutonium producing reactor embodying a recirculation cooling system.

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Design criteria for the following items were approved by the Design Council during August: process water system; thermocouple system; heating, ventilating and air conditioning; power calculator system; basic reactor building requirements; and metal charging system.

CG-657 - Improvements to Redox Plant Ventilation System

Detailed design was completed during August for improvements to the Redox Plant Ventilation System, consisting of two portable ventilation filter units for the Redox canyon and an enclosure for the Redox canyon crane electrical switchgear.

CG-660 - Modifications and Additions to the Metallographic Cell - Radiometallurgy Building

At the end of August, detailed design of equipment modifications and additions to the metallographic cell in the Radiometallurgy Building, 300 Area, was 12.5% complete. A design progress schedule for Project CG-660 was transmitted to HOO-AEC on August 15, 1956.

CG-661 - Additional Heat Generation Facility - 189-D Building

Studies were continued during the month to determine the most effective and economical method of supplying additional heat generation capacity in the 189-D Building.

CG-663 - Steam Driven Auxiliaries - Buildings 165-KE and 165-KW

Detailed design of steam driven auxiliaries and associated equipment for Buildings 165-KE and 165-KW advanced to 85% complete during August.

CG-664 - 350° C Flow Loop - 314 Building

At the end of August, detailed design was 90% complete for a recirculating flow loop to be installed in the 314 Building, 300 Area, for use in corrosion testing of fuel element jacketing materials.

CG-665 - Metal Loading Facilities - 100-B, D, DR, F and H Areas

Detailed design of auxiliary, non-personnel, elevators for use in metal charging in each of the 105-B, D, DR, F and H Buildings was 6.5% complete at the end of the month.

CG-666 - Zone Temperature Monitoring - 100-B, C, D, DR, F and H Areas

At the end of August, detailed design of zone temperature monitoring facilities for 100-B, C, D, DR, F and H Areas was 66.5% complete.

CG-672 - Monochromatic Neutron Beam Facility

Detailed design of a monochromatic neutron beam facility for installation in the 105-KE Reactor advanced to 80% complete during the month.

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

At the end of August, detailed design was 47% complete for an exo-reactor high pressure, high temperature recirculating test loop to be installed in Building 1706-KE for functional testing of various water plant components.

CG-676 - Fuel Element Pilot Plant - Semi-Works

Detailed design was completed during the month for the installation in the Fuel Element Pilot Plant, 300 Area, of a semi-works facility for the production of lead-dip processed internally and externally cooled fuel elements.

CG-681 - Hanford Equipment in the ETR

Work continued during August on the preparation of design scope for the installation in the Engineering Test Reactor (ETR) at the National Reactor Testing Station, Arco, Idaho of facilities for testing various fuel element designs and fabrication methods.

CG-682 - High Level Examination and Cut-Off Cell - 327 Building

Funds in the amount of \$16,500 were authorized in June by HOO-AEC for the design of a high level examination and cut-off cell for installation in the Radio-metallurgy Building, 300 Area. During August, work was initiated on the preparation of a revised project proposal to request an increase in the scope of work and to request authorization of construction funds.

CG-686 - In-Line Monitoring Instruments - Redox and Purex

Detailed design for the provision of additional in-line analytical instrumentation for improved process control in the Redox and Purex Plants advanced to 13% complete during August.

CA-688 - Additional Waste Disposal Facilities - BC Area

Detailed design for Project CA-688, which covers the provision of additional waste disposal facilities for scavenged TBP Plant wastes, to be located west and southwest of the BC crib area, was 64% complete at the end of the month.

CG-691 - Improved Task I and Task II Facilities - 234-5

Detailed design of improved, continuous Task I and Task II facilities for the 234-5 Building was 6% complete at the end of August. A design progress schedule for Project CG-691 was transmitted to HOO-AEC on August 22, 1956.

D.O. A-00453 - Installation of Water Meters - Richland

Preparation of a lump sum bid package of drawings and specifications was 98% complete at the end of August for the installation of water meters on lines to all residences and private commercial facilities in Richland, to 700 Area industrial buildings, and to Central Stores and Transportation Buildings.

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DESIGN WORK COMPLETED DURING AUGUST

D.O. A-14325 - Redox Plant - Drawing for Air Sampler
D.O. A-15412 - Redox Plant - Drawing for Filter Shells
D.O. A-18432 - Ventilation Revisions - 313 Canning Area
D.O. A-18741 - Redox Plant - Review of Unused Piping
D.O. A-19078 - Redox Plant - Design for Positive Closing Dampers
D.O. A-25134 - 100-H Area - Pneumatic Gun Barrel Exerciser
D.O. C-85439 - TBP Plant - Electrical Jumper Design

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. 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.

RH Beaton
Manager - Design
ENGINEERING DEPARTMENT

RH Beaton:HDT:vjm

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HW-45119 **DEL**

PROJECT SECTION

August 1956

I. SUMMARY

A. Organization and Personnel

Following is a summary of personnel changes in Project Section during the month:

	<u>July 31, 1956</u>	<u>August 31, 1956</u>	<u>Net Change</u>
Employees on payroll	328	320	-8
Technical Graduates, Rotational	3	3	
College Juniors	1	1	

The end-of-month status involved these changes:

	<u>Project Section</u>
Payroll Additions	3
Payroll Removals	6
Transfers into Section	3
Transfers from Section	8

The organizational planning advanced into the final stages and several physical moves were accomplished during the latter part of August.

B. Scope of Activities

At the end of the month, construction completion status of major process facilities was as follows:

<u>Project No.</u>	<u>Title</u>	<u>Completion</u>	
		<u>Scheduled</u>	<u>Actual</u>
CA-512	100-K Area Facilities, Revisions #3 and #4	100% ^a	100% ^a
CA-512	1706 KER Recirculation Facilities	98%	97%
CA-513-E	Purex Facilities, Part E	49% ^b	49% ^b
CA-546	Fuel Element Pilot Plant	100% ^a	100% ^a
CG-558-I	Reactor Plant Modifications	67% ^c	70% ^c
CG-558-II	Reactor Plant Modifications	15% ^c	15% ^c
CG-598	Purex Acid Fractionator	100%	74%
CG-600	100-C Alterations	4% ^c	1% ^c
CG-613	Hanford 4X Program, Metal Conversion Plant	78%	87%

a Complete with exceptions.

b Includes work on installation of second remote crane.

c Based on revised schedule.

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Project No.	Title	Completion	
		Scheduled	Actual
CG-621	Redox Contamination Control Facilities	60% ^c	60% ^c
CG-643	Redox Capacity Increase, Phase III	90% ^d	93% ^d
CG-647	Back-Up Radioiodine Removal Facility, Purex	6%	7.5%

C. Craft Labor

The primary labor problem, obtaining additional pipefitter-welders, was relieved slightly by the gradual build-up to a total of 74 on payroll as of August 27, 1956. This additional manpower for welding enabled Minor Construction to expand its working forces. The balance among craft crews improved during the month, particularly as fitter-welders were relieved from CG-613, Metal Conversion Plant, and re-assigned to CG-558, Reactor Plant Modifications.

D. Safety and Security

The regular meetings were continued by all components for discussions of safety, security, and health topics. As of August 26, 1956, Minor Construction forces completed 933,691 manhours without a disabling injury. The new safety standards for construction operations have been sent to printing.

Internal security measures have been effective to the degree that only two security violations occurred during the initial eight calendar months of 1956.

E. Highlights

Inspection Sub-Section

A new basis for inspectors' expense accounts was instituted during the month. This new system permits reimbursement to the General Electric Company for certain items which previously have been charged to the "variation" account, and the allowable expense of inspectors has been increased by \$1.00 per day.

During August a new procedure was established to provide an estimate of manhours to complete each inspection job. The estimate is made before the orders are issued from the Richland office. The estimated manhours are assigned to the appropriate area supervisor as a maximum expenditure. Any overrun must be justified, and the expended manhours are to be used as a basis for liquidating costs.

The total work load for inspection continued the gradual decrease to a total of 415 orders for items requiring inspection as of August 31, 1956. Of these, 382 were assigned for inspection as follows: Off-site inspectors, 305; on-site inspectors, 67; and Government agencies, 10. Testing under the Corrosion Evaluation Program entailed 100 Huey Tests, 42 oxalic acid tests, 75 macro-micro tests, 2 physical tests, and 128 chemical determinations.

c Based on revised schedule

d For work now authorized by interim authorization.

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HW-45115

Although the steel strike was officially settled the mills have been slow in regaining their production rates. The net effect on the vendor inspection function has been a general delay of fabrication orders.

Minor Construction Sub-Section

The responsibilities for procurement of construction materials, warehousing, material control, and other related functions were transferred to the J. A. Jones Company on August 13, 1956. The procedures for the above operations were approved and are presently in effect. Minor Construction work assignments were continued on a priority basis. New assignments were received on one project and 32 work orders. The total amount authorized to Minor Construction at the end of the month was \$14,972,657 of which \$7,850,512 has been expended or committed leaving an unexpended amount of \$7,122,145. The small tool inventory was completed and provides a more comprehensive listing of all items.

Project Engineering Sub-Section

The rescheduling of work sequences was continued on all major projects. Approximate schedules are being estimated as work progresses, and as shutdowns can be anticipated.

Bids for the second remote crane and for the slave crane viewing periscope, Project CA-513-E, Purex Facility, have been received and are being reviewed. New steel has been ordered for the two spare Purex concentrators, but the best current estimate for rolling of the plate is October or November, 1956. Fabrication can be expected in the second quarter of FY-1957.

Additional welder-fitters were obtained from Project CG-613, Metal Conversion Plant, and utilized on Project CG-558. An outage occurred between August 15-22, 1956, for tube installation at 105-B Area. The schedules for CG-558 Phases I and II were revised as of August 1, 1956.

Final inspection was held on August 10, 1956, for the 224-UA Building structure and for the Railroad Loading Pad and Road - Project CG-613. The few minor exceptions noted have been completed.

Project CA-546, Fuel Element Pilot Plant, was physically completed as of August 15, 1956, and the financial closing notice issued.

Project Service Sub-Section

The Estimating Unit completed forty-one estimates. The completed estimates were made up as follows: Five, project proposal; four, fair cost; fifteen, contract modifications; twelve, studies and others. Field surveys provided field services on eleven orders for HAPO plant areas and eight in Richland, including the Suburban Land Survey. The Reproduction Unit processed a total of 447,158 square feet of finished prints during the month of August as compared to the 240,027 square feet processed in July. The largest orders processed were for the Fuel Element Pilot Plant, Fuel Element Pilot Plant - Semiworks, and the Reactor Plant Modifications for Increased Production.

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The Engineering Files Unit delivered 750 original tracings of North Richland buildings and facilities to the Commission and U. S. Army Corps of Engineers. A total of 4,475 inactive and void tracings were sent to the Permanent Records Center during August.

G. Monthly Report of Inventions or Discoveries

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

None.


Manager - Projects

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* Excluding 1706 KER
 ** 1706 KER Facilities

CA-548 - New VSR Test Tower

Project Preparation: 100% Scoping: 100% Prelim. Design: 100%

Actual

Detailed Design: 98%

Directive Completion Date: March 1, 1957

Total Authorized Funds: \$125,000 - GE \$16,500 - AEC \$108,500

Total Estimated Cost: \$125,000

The architect-engineers, W. C. Nickum & Sons have essentially completed the detailed design. The specifications were received and are being reviewed. The project is scheduled to be advertized for bids by September 1, 1956.

CG-579 - Effluent Water Monitoring Improvements - 100-C

Weighted Scheduled Actual

Field Progress:

P.F. 100%

Total 100% 80%

Approx. Accumulated Manpower: (man-days)
P.F. 750

Directive Completion Date: September 1, 1956

Total Authorized Funds: \$168,000

Total Estimated Cost: \$168,000

Scoping, preliminary and detailed design are the responsibility of the Design Section.

No work accomplished this period as craftsmen have been assigned to higher priority work. A revised project proposal requesting an extension of time to February 1, 1957 is being routed for approval signatures.

CA-615 - Mechanical Maintenance Shop Centralization - 100 Areas

Weighted Scheduled Actual

Detailed Design: 100% 100%

Field Progress:

F.P. 54% * 40% * 40%

M.C. 10% * 23% * 23%

P.F. 36% *. 59% * 59%

Total 45% 45%

Average Manpower:

F.P. 4

M.C. 2

P.F. 1

Approx. Accumulated Manpower: (man-days)

F.P. 152

M.C. 75

P.F. 205

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CA-615 - Mechanical Maintenance Shop Centralization - 100 Areas (Con't)

* Based on tentative schedule.

Directive Completion Date: February 28, 1957
 Total Authorized Funds: \$92,000 - GE \$42,000 - AEC \$50,000
 Total Estimated Cost: \$92,000

The contractor has placed the second half of the 1703-B Building on the necessary foundation.

The concrete pads have been poured for the compressor house, bottle storage and sheet metal storage.

Minor Construction started the remodeling of the janitor closet in 1717-H. The layout crew has staked out the steamline route in the 105-H Area.

CG-616 - Installation of Acid Feed Equipment 100-B, D, DR, F, and H Areas

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Field Progress:			
F.P.	96.4%	8%	10%
M.C.	3.6%	20%	25%
Total		9%	11%

Average Manpower:	Approx. Accumulated Manpower: (man-days)
F.P. 20	F.P. 280
M.C. 2	M.C. 100

Directive Completion Date: October 1, 1956
 Total Authorized Funds: \$400,000
 Total Estimated Cost: \$443,200

Scoping, preliminary and detailed design are the responsibility of the Design Section.

Sewer pipe installation at 183-DR is complete except for tie-ins. The tank supports and footings at 183-DR have been completed. The transport line from 183-C to 183-B is being installed and the grade crossings have been completed.

Work at 183-D has been started.

CG-638 - Alum Activated Silica Water Treatment Facility - Phase II

Directive Completion Date: April 1, 1957
 Total Authorized Funds: \$275,000
 Total Estimated Cost: \$275,000

Scoping, preliminary and detailed design are the responsibility of the Design Section.

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CG-638 - Alum Activated Silica Water Treatment Facility - Phase II (Con't)

All work on this project held up pending field evaluation of "Separan".

CA-650.- Replacement, Repair and/or Removal of Valve Houses - 100-B, D, and F

	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:	100%	100%

Directive Completion Date: December 31, 1956
 Total Authorized Funds: \$65,000 - GE \$3,500 - AEC \$61,500
 Total Estimated Cost: \$65,000

The Notice to Proceed was issued to L. H. Hoffman Construction Company on August 10, 1956. Detailed steel construction drawings have been forwarded by the contractor for comments. Scheduling of field work is the responsibility of the Commission.

CG-656 - Installation of Raw Water Cross-Tie - 105-C

	<u>Actual</u>
Detailed Design:	100%

Directive Completion Date: February 1, 1957
 Total Authorized Funds: \$27,500
 Total Estimated Cost: \$27,500

Authorized funds increased to \$27,500.

The relocation of the sensing line is scheduled for September 6, 1956.

The remaining material is scheduled to be shipped during the last week of August.

CG-661 - Additional Heat Generation Facility - 189-D Building

Total Authorized Funds: \$22,400
 Total Estimated Cost: Not Established

Detailed design is the responsibility of the Design Section.

The project engineering portion of this project has been transferred to Construction Engineering.

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CG-665 - Metal Loading Facilities - 100-B, D, DR, F and H Areas

Directive Completion Date: November 1, 1957
Total Authorized Funds: \$150,000
Total Estimated Cost: \$150,000

Scoping, preliminary design and detailed design are the responsibility of the Design Section.

Placement of the purchase order for the elevators is pending receipt of additional information from the low bidder.

CG-667 - Improved Space Utilization - 105-B, D, and F Buildings

Directive Completion Date: September 30, 1957
Total Authorized Funds: \$212,000
Total Estimated Cost: \$212,000

Responsibility for this project has been transferred to W. P. Nichlason. The Commission is preparing to negotiate an Architect-Engineer contract.

CG-689 - Slug Saw and Etching Equipment

Project Preparation: 100% Scoping: 100%
Total Estimated Cost: \$100,000 to \$200,000

The Commission is reviewing the requirements of this project.

ER-1238 - Central Semi-Automatic Dummy Decontamination Facility

Total Estimated Cost: \$253,000

The project proposal is being routed for approval signatures within the General Electric Company.

1102168

CA-512 - 1952 Reactor Expansion - 100-K Area Facilities

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:		Not Scheduled	98%
Field Progress:			
F.P.	8.72%	100%	24%
M.C.	43.30%	95%	89%
P.F.	47.98%	90%	74%
Total		93%	76%

Average Manpower:

F.P. 4
M.C. 10
P.F. 10

Approx. Accumulated Manpower:

F.P. 281
M.C. 4507
P.F. 4382

Directive Completion Date: May 1, 1955

Total Authorized Funds: \$ 157,500,000 - GE \$28,210,000 - AEC \$129,290,000

Total Estimated Cost: \$ 157,500,000

A revised construction schedule reflecting the additional work and the extended completion date, as stated in the last work authority for Project CA-512, is being prepared.

Plant Forces:

The turrets have been set and rotameter racks erected in 105-KW for the Gamma Water Monitoring facility. Pipe work is approximately 90% complete and copper tubing runs are approximately 75% complete. The electrical instrumentation work has not yet begun. Work is being performed on Gamma Water Monitoring Facility in 105-KE and is now approximately 50% complete.

Installation of evaporative cooler in 183.1 KE has been completed. The installation in 183.1 KW is approximately 90% complete.

Two hundred and eighty boards of four resistors each have been installed in the Temperature Monitoring System in 105-KE. Installation of the new resistors has not begun in 105-KW.

A work order has been issued to 100-K Area Maintenance for revision of LSA and LSB switches and latch mechanisms in all K Area vertical safety rods.

Minor Construction:

All of the 107 retention tanks in both areas have been raised and shimmed. Grouting is complete in 107-KW and the three steel bands have been installed. Two tanks in 107-KE have been grouted and the band installed on one tank.

All of the float switches have been installed on the 107 tanks to create a 4' water heel. All electrical work remains to be done.

The Flame Failure System has been installed on steam generator #3 in 105-KE and #2 in 105-KW. Additional units will be installed in the four remaining units as Operations can make them available to Minor Construction forces.

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HW-45115

CA-512 - 1952 Reactor Expansion - 100-K Area Facilities (Con't)

Work has been started on the PIE-2 pump installation. Excavation is complete and construction of structure is underway. Installation is scheduled for completion first week of October.

Fixed-Price Contracts:

Contract AT(45-1)-1115 - 1704-K & 1720-K Heating Systems

This contract is complete with exceptions that are to be negotiated by the Commission with the contractor. A final inspection was held on August 23, 1956, and exceptions were listed. The contract was modified to exclude balancing of the hot water (glycol) heating system in building 1704-K. This work will be performed by Plant Forces when the system is activated this fall.

Bid Invitation AT(45-1)-1157 (Formerly 1143) Acid Feed System

All original bids were rejected and new bids invited. Bid opening is scheduled for September 6, 1956.

CA-512 - 1952 Reactor Expansion - 100-K Area Facilities - 1706-KER Rec. Loop

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Field Progress:			
F.P.	60%	98% *	97.5%
M.C.	40%	98%	96%
Total		98%	97%
Average Manpower:	Approx. Accumulated Manpower: (man-days)		
F.P. 16		F.P. 4526	
M.C. 0		M.C. 2900	

Directive Completion Date: September 1, 1956

* Per revised schedule.

Final Acceptance Test Procedures have been started.

Construction is complete except for final electrical connecting and instrument calibration plus miscellaneous insulation and painting.

All Westinghouse pumps have been run-in in the presence of the factory representative. Some difficulty was had on installation, but this has been corrected. Difficulty is being encountered in the G.E. Reactrol controls for the pressurizer degasifier heating elements. They have a tendency to drift on automatic operation. Assistance from the General Electric Company has been requested to correct this matter.

1102170

CG-558 - Reactor Plant Modifications for Increased Production - Phase I

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Field Progress:			
F.P.	40.88%	88%	92%
M.C.	56.82%	50%	53%
P.F.	7.88%	69%	69%
Total		67%	70%

Average Manpower:	Approx. Accumulated Manpower: (man-days)
F.P. 304	F.P. 39,369
M.C. 102	M.C. 92,479
P.F. 6	P.F. 4,803

Directive Completion Date: December 15, 1957
 Total Authorized Funds: \$ 25,900,000
 Total Estimated Cost: \$ 25,900,000

Scoping, preliminary and detailed design are the responsibility of the Design Section.

Plant Forces

Hamline Flexor type switches are being procured for replacement in all pressure monitoring gages whose switches have not previously been replaced.

Minor Construction

Additional welder-fitters have been obtained from Project No. CG-613 and from outside sources. Pending satisfactory shift work agreement with the pipefitters the target shutdown schedule should be met. There are two jurisdictional disputes between the pipefitters and electricians regarding pump installation at 181-D and graphic panel installation at all 190 buildings; these disputes must also be settled.

CG-558 - Reactor Plant Modifications for Increased Production - Phase II

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Field Progress:			
F.P.	56.00%	19%	21%
M.C.	40.81%	10%	13%
P.F.	3.19%	2%	8%
Total		15%	18%

Average Manpower:	Approx. Accumulated Manpower: (man-days)
F.P. 185	F.P. 13,627
M.C. 126	M.C. 11,844
P.F. 1	P.F. 83

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1102171

CG-558 - Reactor Plant Modifications for Increased Production - Phase II (Con't)

Directive Completion Date: February 28, 1958
Total Authorized Funds: \$11,200,000
Total Estimated Cost: \$11,200,000

Scoping, preliminary and detailed design are being managed by the Design Section.

CG-600 - 100-C Alterations

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Field Progress:			
M.C.	83.8%	4%*	1%*
P.F.	16.2%	4%*	2%*
Total		4%*	1%*

Approx. Accumulated Manpower: (man-days)
M.C. 44

Directive Completion Date: July 1, 1957
Total Authorized Funds: \$765,000
Total Estimated Cost: \$765,000

* As per revised schedule.

Scoping, preliminary and detailed design are being managed by the Design Section

The revised schedule was submitted to the Commission August 14, 1956. This schedule approved August 23, 1956 by the Commission.

CG-642 - Continuous Charge-Discharge Facility - 105-C

Total Authorized Funds: \$200,000 (Interim Authorization)
Total Estimated Cost: Not Established

Detailed design, including procurement of equipment components for testing purposes, is the responsibility of the Design Section.

Detailed design is proceeding and detail drawings are being reviewed for approvals.

CG-663 - Steam Auxiliaries for the 165-K Steam Generators

Directive Completion Date: August 1, 1957
Total Authorized Funds: \$555,000
Total Estimated Cost: \$555,000

Scoping, preliminary and detail design are the responsibility of the Design Section. Requisitions are being prepared and processed for engineered equipment. Detail design is proceeding.

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HW-45115

DEL

CG-666 - Zone Temperature Monitoring - 100-B, C, D, DR, F and H

Directive Completion Date: January 1, 1958
Total Authorized Funds: \$ 900,000
Total Estimated Cost: \$ 900,000

Scoping and detail design are the responsibility of the Design Section.

Procurement is continuing.

CG-672 - Monochromatic Beam Neutron Spectrometer

Directive Completion Date: June 30, 1957
Total Authorized Funds: \$ 112,000
Total Estimated Cost: \$ 112,000

Scoping, preliminary and detailed design are the responsibility of the Design Section.

Comment drawings on detailed design are being reviewed. Material is being requisitioned.

CG-674 - Water Plant Component Test Loop 1706-KE (ER-1234)

Directive Completion Date: December 31, 1957
Total Authorized Funds: \$ 125,000
Total Estimated Cost: \$ 125,000

Scoping, preliminary and detail design are the responsibility of the Design Section.

Design is continuing and drawings of equipment have been issued for comment. No drawings have been approved as yet.

CG-678 - Laboratory Facilities for the Special Irradiation Studies

Scoping: 100%

Directive Completion Date: October 1, 1957
Total Authorized Funds: \$ 45,000
Total Estimated Cost: \$ 45,000

This project was approved by the Commission June 21, 1956. Directive has been issued by the Commission. The work authority was issued August 28, 1956. Negotiations are being started by the Commission to obtain architect-engineer services for design of the facility.

1102173

CA-513-A, B, C & D - Purex Facility - Expansion of 200 Areas Facilities

Dec

	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:	100%	100%
Field Progress:		
Total	100%	100%

Total Authorized Funds: \$79,450,000 - GE \$7,972,000 - AEC \$71,478,000
 Total Estimated Cost: \$79,450,000

The CA-513-B, C & D portions of this project are complete. The following items remain to be accomplished.

1. Fabrication (by Steel & Alloy Tank Co., Newark, New Jersey) insulation and mock-up on site of two spare concentrators, expected in second quarter, 1957.
2. Miscellaneous paving in vicinity of the 202-A Building.
3. Installation of electric heaters in series with present steam heaters on dissolver off-gas streams. Detail design approximately 35% complete.

CA-513-E - Purex Facility, Expansion of 200 Areas Facilities

	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:	65%	76%
Field Progress:		
Total	49%	49%

Directive Completion Date: April 1, 1958
 Total Authorized Funds: \$3,100,000 - GE \$2,662,000 - AEC \$438,000
 Total Estimated Cost: \$3,100,000

Detailed design of the second remote crane and associated facilities is the responsibility of the Design Section.

Bids for the new remote crane were opened August 27, 1956 and are now being reviewed.

Bids for the slave crane viewing periscope have been received and reviewed.

CG-598 - Purex Acid Fractionator

	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:	100%	100%
Field Progress:		
F.P.	100%	100%
M.C.	100%	78%
Total	100%	74%

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HW-45115

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CG-598 - Purex Acid Fractionator (Continued)

Average Manpower: M.C. 8 Approx. Accumulated Manpower: (man-days)
M.C. 3740

Directive Completion Date: September 1, 1956
Total Authorized Funds: \$920,000
Total Estimated Cost: \$920,000

A revised project proposal is being routed for approval signatures within the General Electric Company. It requests the extension of the beneficial use date to January 1, 1957, and physical completion date to March 1, 1957.

Additional fitter craftsmen are now available for 200 East Area. Work was resumed on piping and instrumentation tubing on Minor Construction's work in the 202-A Building. Electrical work is progressing satisfactorily. Miscellaneous structural and architectural items are being completed.

Opening of bids for subcontracting of piping, mechanical and insulation (alternate bid) for new facility is scheduled August 28, 1956.

All engineered equipment for this project is now on site.

CG-613 - Hanford 4X Program, Metal Conversion Plant

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Field Progress:			
F.P.	28.6%	87%	87%
M.C.	70.2%	74%	86%
P.F.	1.2%	84%	84%
Total		78%	87%

Average Manpower: Approx. Accumulated Manpower: (man-days)

F.P. 0	F.P. 5,000
M.C. 170	M.C. 17,000
P.F. 2	P.F. 544

Directive Completion Date: April 1, 1957
Total Authorized Funds: \$4,398,000
Total Estimated Cost: \$4,398,000

Phases III & IV - Construction of 224-UA Building and Railroad Loading Pad and Road

All remaining exceptions have been completed.

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FD-16

CG-613 - Hanford 4X Program, Metal Conversion Plant (Continued)

Phase V - Contract for Maintenance Facility

Bids have been received. The low bid of \$95,200 was submitted by Hoffman Construction Company. As all bids are somewhat over the original scope estimate, they are being held in abeyance pending a decision to modify certain of the facilities now included in the design.

Phase VI - Railroad Car Modification

Five of the fifteen cars have not yet been received. One car of each of the two railroads has been loaded with containers to check dimensions. Because of an interference, modifications to the fork lift truck will have to be made. Design of the sample containers is underway.

Minor Construction Work

Work has been completed in the first three calciner cells with a few exceptions and the facility has been accepted by Manufacturing. Work is also complete in the 224-U Building with a few exceptions and has been accepted by Manufacturing. The new loadout facilities in 224-U and lunchroom facilities are included in the exceptions.

A decision has been made to delete the ED-1 conversion work from the project because the vessel will be permanently shut down in an estimated eight to nine months, and because the advantages to be gained, as demonstrated by the already completed EB-1 conversion, are not commensurate with the cost involved.

Both swing and graveyard shifts have been dropped. All the remaining work will be performed on a one-shift, 5 day per week basis.

General Project Status

A revised directive has been received from the Commission authorizing the additional funds and extension of completion date requested.

CG-621 - Redox Contamination Control Facilities

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Field Progress:			
M.C.	63%	53%	53%
P.F.	37%	72%	72%
Total		60%	60%

Average Manpower:

M.C. 3
P.F. 1

Approx. Accumulated Manpower: (man-days)

M.C. 1416
P.F. 1097

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CG-621 - Redox Contamination Control Facilities (Continued)

Directive Completion Date: December 31, 1956
Total Authorized Funds: \$765,000
Total Estimated Cost: \$765,000

Scoping, preliminary and detailed design are the responsibility of the Design Section.

Letter project proposal Revision No. 3 is being routed for approval signatures within the General Electric Company. This revision requests an extension of the project completion date and reflects the latest cost to complete estimate (no increase in total authorized funds).

In Cell Ozonization

With the exception of completing fabrication of the ozone gamma monitor equipment and installation of this facility in the building, this phase of the project is essentially complete with only minor miscellaneous clean-up items remaining to be done. Beneficial use is dependent upon a successful test run.

Modifications to J-6 Vent

Drainage problems have arisen on the J-6 vessel installation. It is hoped that a jumper modification will correct this condition and efforts are now underway to accomplish this. Other than this, only minor clean-up items remain to be completed.

Contaminated Equipment Replacement

A requisition for connector heads needed for jumpers for this phase of the project was prepared June 13, 1956. Only one bid was received on the majority of the connectors requisitioned and this was from a previous supplier, Gougler. The Commission has held up placing the order because of the increased cost since the last order. Gougler has been requested to justify the increased cost quoted in his bid. It was hoped that this order could be placed quickly as these are very long term delivery items.

Canyon Washdown Facilities

Minor Construction now has fitters available for this work. Installation of piping on the roof has been started.

CG-624 - Redox Railroad Tunnel Ventilation Barrier

	<u>Scheduled</u>	<u>Actual</u>
Field Progress:		
M.C.	*	30%

*A project proposal revision letter requesting an extension of the completion date to December 1, 1956, has been submitted. A revised schedule will be issued upon receipt of the new directive completion date.

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CG-624 - Redox Railroad Tunnel Ventilation Barrier (Continued)

Average Manpower: M.C. 6 Approx. Accumulated Manpower: (man-days)
M.C. 165

Directive Completion Date: September 1, 1956
Total Authorized Funds: \$57,000
Total Estimated Cost: \$57,000

Scoping, preliminary and detailed design are the responsibility of the Design Section.

A substantial part of the electrical installation has been completed, progress having been hampered by the short time limits. The scaffolding on the railroad flat car was completed. The installation of the door is progressing.

CA-625 - Additional Waste Disposal Facilities - 200 Areas

Total Authorized Funds: \$55,000 (Phase I)
Total Estimated Cost: \$55,000

Preliminary and detailed design, including field surveys, are the responsibility of the Design Section.

CG-635 - Redox Stack Particulate Sampler

	<u>Weighted</u>	<u>Actual</u>
Field Progress:		
M.C.	100%	35%
Average Manpower:		
M.C. 8		M.C. 140
Approx. Accumulated Manpower: (man-days)		

Directive Completion Date: May 1, 1957
Total Authorized Funds: \$40,000
Total Estimated Cost: \$42,000

Detailed design is the responsibility of the Design Section.

The tower for the prefabricated building was completed, moved to the site and erected on concrete piers previously installed. Work is progressing at the Minor Construction shops on fabrication of the probe.

Approval has been received from the Commission for extending the project completion date to May 1, 1957.

A revised construction schedule is being prepared and will be submitted to the Commission shortly.

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CG-635 - Redox Stack Particulate Sampler (Continued)

Under the reorganization, project management responsibility for this project will be assigned to Construction Engineering as of September 1, 1956.

CG-636 - SWP Service Facilities - Redox

Total Authorized Funds: \$ 100 (Project Section)
Total Estimated Cost: \$157,000

The project proposal preparation is the responsibility of the Design Section.

Further processing of the project proposal, beyond the Manufacturing Department Manager, has been held up pending reorganization.

CG-643 - Redox Capacity Increase - Phase III

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Field Progress:			
M.C.	25%	75%	83%
P.F.	75%	95%	95%
Total		90%	93%

Average Manpower:	Approx. Accumulated Manpower: (man-days)
M.C. 2	M.C. 260
P.F. 0	P.F. 206

Directive Completion Date: October 1, 1956
Total Authorized Funds: \$211,500
Total Estimated Cost: \$Not Established (Approx. \$1,000,000)

Detailed design is the responsibility of the Design Section.

Minor Construction plans to complete work on the modification of the second 2E column by the end of August.

The request for additional funds for advanced procurement of critical materials and limited on-site fabrication is awaiting the Commission's authorization.

Revision No. 2 to the project proposal is being routed for approval signatures within the General Electric Company.

CG-647 - Back-Up Radioiodine Removal and Acid Recovery Facilities - Purex

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:		100%	100%

CG-647 - Back-Up Radioiodine Removal and Acid Recovery Facilities - Purex (Con't)

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Field Progress:			
F.P.	80.5%	0%	0%
M.C.	19.0%	30%	39%
P.F.	0.5%	0%	0%
Total		6%	7.5%

Average Manpower:

M.C. 15

Approx. Accumulated Manpower: (man-days)

M.C. 850

Directive Completion Date: September 15, 1957

Total Authorized Funds: \$1,150,000

Total Estimated Cost: \$1,150,000

Detailed design is the responsibility of the Design Section.

Minor Construction completed their portion of the 293-A structure - (floor and two walls, half-filled). The fixed-price contractor will be permitted to start construction the first week in September instead of October 1, 1956, as called for in the contract.

CG-648 - Auxiliary Radioiodine Removal and Nitric Acid Recovery Facilities

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Field Progress:			
F.P.	*	*	
Total			1%

Directive Completion Date: September 15, 1957

Total Authorized Funds: \$870,000

Total Estimated Cost: \$870,000

Preliminary and detailed design are being managed by the Design Section.

The excavation for the 293-S Building was completed. The fabrication of concrete forms was started. Commission furnished materials with minor exceptions are available to the Hoffman Construction Company. The Thorn & Marble Company, the mechanical subcontractor under the Hoffman Construction Company, has indicated the desire to prefabricate pipe formations in their temporary shop now located near the SX Tank Farm. The use of this shop, although not mentioned specifically in the contract, is not contrary to contract requirements.

*The preparation of a construction status chart for this project has been delayed due to differences in opinion between the Hoffman Construction Company and the General Electric Company as to the weighted percent to be applied to individual components of this project. These differences have now been resolved and a schedule is being prepared.

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CA-653 - Redox Cooling Water Disposal

	<u>Weighted</u>	<u>Scheduled*</u>	<u>Actual</u>
Field Progress:			
Govt. Furnished Equipment	27%	100%	100%
F.P.	8%	100%	100%
M.C.	46%	40%	40%
P.F.	19%	90%	90%
Total		88%	88%

Average Manpower:

F.P. 0
M.C. 2
P.F. 2

Approx. Accumulated Manpower: (man-days)

F.P. 550
M.C. 160
P.F. 75

Directive Completion Date: September 30, 1956

Total Authorized Funds: \$225,000

Total Estimated Cost: \$225,000

Scoping, preliminary and detailed design are the responsibility of the Design Section.

Erwen Construction Company completed all work on contract AT(45-1)-1123 on August 16, 1956, with four minor exceptions which were cleared on August 24, 1956.

*Schedule percentages are in accordance with the revised schedule submitted August 20, 1956.

CG-657 - Improvements to Redox Plant Ventilation

Directive Completion Date: July 31, 1957

Total Authorized Funds: \$205,000

Total Estimated Cost: \$205,000

Detailed design is the responsibility of the Design Section.

Bid opening for the portable ventilation filter units is presently scheduled for September 7, 1956.

Detailed designs are nearing completion for the electrical equipment enclosure for the 75-ton crane, the burial boxes, and liners for the portable ventilation units.

CA-662 - 2101-M Building Conversion

Total Authorized Funds: \$ 2,000

Total Estimated Cost: \$123,500

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HW-45115

CA-662 - 2101-M Building Conversion (Continued)

The preparation of a scope revision to the subject proposal has been halted pending a clarification of future HAPO warehousing plans.

CA-668 - Installation of Sprinkler System, 275-EA Building

Project Preparation: 100% Scoping: 100% Prelim. Design 100%

Total Authorized Funds: \$ 2,000
Total Estimated Cost: \$26,800

The project proposal is being held without action pending a study and evaluation of the General Electric Company's warehousing requirements.

CA-675 - Change House Facilities, 275-W Building

Actual

Detailed Design: 85%

Total Authorized Funds: \$4,800 - GE \$2,300 - AEC \$2,500
Total Estimated Cost: \$33,500

The architect engineer, W. C. Nickum & Sons, is nearing completion of the design for this facility.

CA-683 - Relocation of Purex Cooling Water Swamp

Total Authorized Funds: \$ 20,000 (for Design only)
Total Estimated Cost: \$333,000

Preparation of the project proposal is the responsibility of the Design Section.

Title I, II and III Services are being performed by Gray & Osborne, Architect-Engineers, of Yakima, Washington. Preliminary plans are under study by General Electric. These drawings propose two alternates, one is an open ditch where possible, the other is a concrete pipe line.

The General Electric Company's Design Section will make a recommendation.

1102182.

CG-686 - In-Line Monitoring Instruments - Redox and Purex

Directive Completion Date: December 1, 1958

Total Authorized Funds: \$550,000

Total Estimated Cost: \$550,000

Scoping, preliminary and detailed design is the responsibility of the Design Section.

CA-688 - Additional Waste Disposal Facilities - BC Crib Area - Phase I & II

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
	Phase II	Phase I	Phase II
Field Progress:			
F.P.	100%	100%	10%
M.C.		100%	
Total		*	100%

Average Manpower:

F.P. 5

M.C. 1

Approx. Accumulated Manpower: (man-days)

F.P. 200

M.C. 16

Directive Completion Date: May 31, 1957

Total Authorized Funds: \$216,000 - GE \$21,200 - AEC \$194,800

Total Estimated Cost: \$216,000 - Phase I, II & III

Detailed design is the responsibility of the Design Section.

Phase I - The facility was accepted and turned over to Operations on Friday, August 17, 1956.

Phase II - The contractor, Grant-Sine, started work on Phase II August 13, 1956, when the subcontractor, R. J. Strasser, started well drilling. Tuesday, August 14, 1956, Erwen Construction Company moved in as a subcontractor to Grant-Sine and started excavation. The first crib and piping are to be completed October 10, 1956, with 60 days to complete the balance of the cribs on a graduated timetable with 12 days allowed between each crib completion.

*A schedule of the overall project is being prepared for submission to the Commission.

CG-691 - Improved Task I and II Facilities, 234-5 Building

Total Authorized Funds: \$175,000 (Interim Authorization, Design and Procurement)

Total Estimated Cost: \$700,000

Scoping, preliminary and detailed design are the responsibility of the Design Section.

DECLASSIFIEDCG-691 - Improved Task I and II Building (Continued)

Information necessary for the construction project proposal preparation was submitted to Design Planning.

CG-692 - Modifications to Redox 233-S Concentration Building

Total Authorized Funds: \$150 (Project Section)

Total Estimated Cost: \$98,000

Project Proposal preparation is the responsibility of the Design Section.

The project proposal was approved by HOO-AEC and must be referred to Washington for authorization.

CA-693 - Alterations and Expansion of 2704-C Lunchroom & Office Facilities

Project Preparation: 100% Scoping: 100%

Total Authorized Funds: \$ 1,500

Total Estimated Cost: \$32,000

Under the new reorganization responsibility for this project will be turned over to Construction Engineering, as of September 1, 1956.

The proposal was transmitted to the Commission and it was reviewed during the August 23, 1956, Review Board meeting. Action on approval was deferred.

IR-203 - Coating Waste Transfer Line, 241-S to 241-U

	<u>Actual</u>
Detailed Design:	100%

Directive Completion Date: November 30, 1956

Total Authorized Funds: \$17,800

Total Estimated Cost: \$17,800

This informal request has not been started due to higher priority work.

IR-207 - Gantry-Crane Facility - 241-A Tank Farm

	<u>Weighted</u>	<u>Actual</u>
Detailed Design:		100%
Field Progress:		
F.P.	36%	100%
M.C.	56%	100%
P.F.	8%	50%
Total		96%

IR-207 - Gantry-Crane Facility - 241-A Tank Farm (Continued)

Average Manpower:

F.P. 1
M.C. 0
P.F. 0

Approx. Accumulated Manpower: (man-days)

F.P. 90
M.C. 70
P.F. 15

Directive Completion Date: January 31, 1957

Total Authorized Funds: \$17,600

Total Estimated Cost: \$17,600

Both Minor Construction and the fixed-price contractor portions of this project have been completed. Work on fabrication of a radiation shield for the crane operator has been started this period by Plant Forces.

IR-211 - Shelters for Regulated Docks - Purex

Directive Completion Date: April 30, 1957

Total Authorized Funds: \$16,500

Total Estimated Cost: \$16,500

Preparation of the informal request is the responsibility of the Project Section.

Project Section Work Authority PM-3273 has been issued with all funds assigned to the Project Section. Design Order A-00642 has been issued to the Design Section for detail design work.

ER-2788 - Reduction of Air Borne Noxious Fumes - 224-U Building

Total Authorized Funds: \$ 200

Total Estimated Cost: \$88,500 incl. \$25,000 Transferred Capital Property

Project proposal preparation is the responsibility of the Design Section.

The project proposal is being circulated for approval signatures within the General Electric Company.

ER-2790 - Expansion of Decontamination Facilities, Hot Semiworks

Total Authorized Funds: \$100

Project proposal preparation is the responsibility of the Design Section.

The proposal is still in the preparation stage. Work includes providing an 18' x 28' addition to the south side of the process building adjacent to the existing hot shop for additional decontamination facilities. Higher priority work has retarded progress on preparation of this proposal.

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ER-2791 - 221-B Fission Products Packaging Study

Total Authorized Funds: \$168

Information on scheduling and work force determination, pertinent to a process engineering study on installing the subject facilities in the 221-B Building, was transmitted to the Technical and Design Sections on June 15, 1956. Since no immediate action is contemplated on preparation of a project proposal, the above ER number was closed out as of August 24, 1956.

ER-2792 - Conversion of Recuplex to a Manufacturing Facility

Total Authorized Funds: \$250.00

Preparation of a project proposal is the responsibility of the Design Section.

Information required for the preparation of the project proposal and estimate has been submitted.

ER-2793 - Improved Recycle Hood - 233-S Building

Total Authorized Funds: \$150

Scoping, preliminary and detailed design are the responsibility of the Design Section.

Work on preparation of a proposal for this facility was cancelled by the sponsor per letter dated July 12, 1956.

Since no further work is required, the above ER number was closed out on August 14, 1956.

ER-2794 - Maintenance & Equipment Storage Facility - 202-S Building

Project Preparation: 25% Scoping: 75% Prelim. Design: 50%

Total Authorized Funds; \$2,000

The scope of this job has been increased to include an additional new building for sodium nitrate storage to be located at the northwest corner of the 202-S Building. Work on the preparation of the proposal has been resumed and it is tentatively planned that the proposal will be ready for inter departmental approval during the first week in October 1956.

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ER-2795 - Office Annex to 234-5 Development and Metallurgy Laboratories

Total Authorized Funds: \$ 2,000

Total Estimated Cost: \$100,000

A project proposal is being prepared by the 200 Areas Project Engineering Unit.

ER-2796 - Purchase Well Casing for Phase II, CA-688

Total Authorized Funds: \$5,200

The well casing has been received and picked up by the contractor for Phase II of Project CA-688.

The charges for the pipe have been accrued against the ER number. It was closed out as completed as of August 24, 1956.

ER-2797 - Continuous Hydrating-Dehydrating Facilities for UO_3 Calciners

Total Authorized Funds: \$112.00

A request was submitted for the study of a proposed installation of continuous hydrating-dehydrating facilities for the UO_3 calciners and submit the probable installation time for such facilities.

The project would provide means to utilize some of the existing calciners for continuous hydration and dehydration of the UO_3 powder to control its quality to meet the requirements of the off-site processors.

The work includes the installation of collector bins, cyclone separators, pneumatic and belt conveyor systems, off-gas system, instrumentation, special valves, service piping, etc.

The study was made and the probable installation time submitted. This was a minimum of sixteen months after the authorization of design and construction funds.

ER-2798 - Utilization of UO_3 Plant Recovered Acid

Total Authorized Funds: \$200

Project proposal preparation is the responsibility of the Design Section.

Information pertinent to the preparation of a project proposal was transmitted to the Design Section on August 21, 1956. The proposal is to provide UO_3 plant and storage facilities in the 241-WR Vault, load-in facilities at Redox, a load-out facility and modifications to the load-in facilities at Purex.

1102187

ER-2799 - Purex Nitric Acid Absorber - Fractionator Replacement

Total Authorized Funds: \$150.00

Preparation of the project proposal is the responsibility of the Design Section.

The Manufacturing Department decided that the replacement fractionator would be of existing design and therefore a new proposal would not be required.

ER-2800 - 222-U Building Ventilation Improvements

Total Authorized Funds: \$250

Project preparation is the responsibility of the Design Section.

Information on scheduling, work force determination, and other project costs, pertinent to preparation of a project proposal was turned over to the Design Section.

Under the reorganization, responsibility for management of this project will be that of Construction Engineering as of September 1, 1956.

ER-2801 - Study Redox Capacity Increase Phase IV

Total Authorized Funds: \$200

The study is the responsibility of the Design Section.

Information pertinent to scheduling and work force determinations, for a process engineering study for Redox Phase IV capacity increase, was transmitted to the design section on August 15, 1956. No further work on this ER is anticipated; however, the ER number will be held open until October 1, 1956 in the event additional work is requested.

CA-546 - Fuel Element Pilot Plant

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Field Progress:			
F.P.	53.6%	100%	100%
M.C.	45.7%	100%	100%
P.F.	.7%	100%	100%
Total		100%	100%

Directive Completion Date: September 1, 1956
 Total Authorized Funds: \$1,600,000 - GE \$787,500 - AEC \$812,500
 Total Estimated Cost: \$1,600,000

This project was completed as of August 15, 1956, and the financial closing notice has been issued.

CA-590 - Fly Ash Collection Equipment - Building 384

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Detailed Design By A-E Contractor:		100%	100%
Field Progress:			
F.P.	100%	99%	92%

Average Manpower: F.P. 4 Approx. Accumulated Manpower: (man-days) F.P. 120

Directive Completion Date: October 30, 1956
 Total Authorized Funds: \$44,000 - GE \$6,000 - AEC \$38,000
 Total Estimated Cost: \$44,000

The separator unit has been installed, and breeching modifications have been completed. Installation of the blower system is in progress.

This project is being transferred to the Fuels Processing Department.

CA-601 - General Grounds Improvements - 300 Area

	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:	100%	100%

Directive Completion Date: December 1, 1956
 Total Authorized Funds: \$60,000 - GE \$5,000 - AEC \$55,000
 Total Estimated Cost: \$60,000

Award of contract is awaiting release of FY 1957 funds.

DECLASSIFIED

1102189

CG-618 - Replacement of Steam Line Support Poles

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:		100%	100%
Field Progress:			
M.C.	100%	55%	50%

Directive Completion Date: August 31, 1956
 Total Authorized Funds: \$110,000
 Total Estimated Cost: \$110,000

All construction is complete in 100-D Area except for minor exceptions.
 Installation has begun in 100-B Area.

Management responsibility for this project is being transferred to Project Engineering Unit "C" (JHM Miller) of the Irradiations Processing Department as of September 1, 1956.

CG-620 - Melt Plant Modifications - 314 Building

	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:	55%	32%

Directive Completion Date: May 31, 1957
 Total Authorized Funds: \$143,000
 Total Estimated Cost: \$143,000

A letter has been received from the using department requesting a scope change on this project. A project revision will be prepared as soon as the purchase cost of the "packaged unit" is established. New quotations are being requested at this time.

CG-630 - Alterations to Minor Construction Fabrication Shops

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:		100%	100%
Field Progress:			
F.P.	15%	100%	85%
M.C.	85%	87%	78%
Total		91%	79%

Average Manpower:

F.P. 2
 M.C. 1

Approx. Accumulated Manpower: (man-days)

F.P. 50
 M.C. 700

Directive Completion Date: October 15, 1956
 Total Authorized Funds: \$93,000
 Total Estimated Cost: \$93,000

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CG-630 - Alterations to Minor Construction Fabrication Shops (Con't)

The fixed-price contractor has completed the siding installation on all buildings in his contract and has completed all but finish work on the gas station addition.

Minor Construction has installed one rolling door in the automotive repair shop.

CA-633 - Remodeling of Facilities - Kadlec Hospital

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Detailed Design: (Electrical and Sprinkler Systems)		100%	100%
Field Progress:			
F.P. (Electrical)	100%	41%	32%

Directive Completion Date: April 1, 1957

Total Authorized Funds: \$90,000 - GE \$3,210 - AEC \$86,790

Total Estimated Cost: \$90,000

National Automatic Sprinkler System Co. has not started field work. Shop fabrication is in progress.

Electric Smith Co. is somewhat behind schedule on lighting work, due partly to very hot weather which prevents work in attic. A larger force will be employed to catch up when weather moderates.

This project transfers to Construction Engineering on September 1, 1956.

CA-639 - Painting Water Plant Structures - 100-DR

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:		100%	100%
Field Progress:			
F.P.	100%	70%	75%

Average Manpower:	Approx. Accumulated Manpower: (man-days)
F.P. 13	F.P. 550

Directive Completion Date: August 31, 1956

Total Authorized Funds: \$75,000 - GE \$8,500 - AEC \$66,500

Total Estimated Cost: \$75,000

The Atomic Energy Commission has approved a revision to the project proposal asking for an extension of time to October 15, 1956.

Contract work is proceeding satisfactorily.

J. A. McCool will be the project engineer on this project after September 1, 1956, when it will be transferred to the Irradiation Processing Department.

1102191

CA-641 - Street Extensions - Hains, Gaillard, Harris

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:		100%	100%
Field Progress:			
F.P.	100%	71%	80%

Directive Completion Date: August 1, 1956 *
 Total Authorized Funds: \$36,000 - GE \$5,700 - AEC \$30,300
 Total Estimated Cost: \$36,000

The Commission has asked for a proposal from the L. W. Vail Co. to give Harris and Hains a penetration type surfacing. The Commission has also asked for an additional \$5,000 to do this work, and General Electric Company should be allotted an additional \$500.

* Extension of the completion date to October 1, 1956 has been requested.

CG-646 - Modifications to Pickling Machines - 313 Building

Project Preparation: 100% Scoping: 100%

Directive Completion Date: January 1, 1957 Est. Completion Date 1-1-57
 Total Authorized Funds: \$55,000
 Total Estimated Cost: \$55,000

Preliminary and detailed design are the responsibility of the Design Section.

A request has been made of the vendor to establish a firm shipping date. He cannot give this information until he has firm commitments on all of his purchased items.

This project is being transferred to the Fuels Processing Department. L. F. Reilly will be the engineer.

CA-649 - FY 1956 Water Tank Replacement

	<u>Scheduled</u>	<u>Actual</u>
Detailed Design: (G. E. Portion)	100%	100%

Directive Completion Date: February 28, 1957
 Total Authorized Funds: \$58,500 - GE \$12,000 - AEC \$46,500
 Total Estimated Cost: \$58,500

Shop Drawings submitted by the contractor have been reviewed and approved with minor comments.

DECLASSIFIED

DECLASSIFIEDCA-649 - FY 1956 Water Tank Replacement (Cont.)

Field work not started.

This project will be transferred to Facilities Engineering - Irradiation Department, with J. A. McCool as engineer.

CA-652 - Water and Sewer Facilities - Wellsian Way

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:		100%	100%
Field Progress:			
F.P.	100%	Not Sch.	

Directive Completion Date: November 30, 1956
 Total Authorized Funds: \$133,000 - GE \$12,000 - AEC \$121,000
 Total Estimated Cost: \$133,000

Materials have been ordered for the contract. The contractor expects to start construction about September 15, 1956. No progress schedule has been submitted by the contractor.

CA-658 - Shielded Personnel Monitoring Station - 747 Building Addition

Project Preparation: 100%

Total Authorized Funds: \$ 150
 Total Estimated Cost: \$160,000

No further action has been requested by the Radiological Sciences Department, following the rejection by the Atomic Energy Commission, Washington.

CG-659 - Decontamination Facilities - 100-H, 200-W, and 300 Areas

Total Authorized Funds: \$ 1,000
 Total Estimated Cost: \$60,000

The status of this project is unchanged. No further action has been requested after the rejection by the Commission.

CG-660 - Modifications and Additions to Metallographic Cell - Radiometallurgy Bldg.

Project Preparation: 100%	Scoping: 100%	Prelim. Design: 100%	
		<u>Scheduled</u>	<u>Actual</u>
Detailed Design:		Not Sch.	15%

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HW-45115

DEL

CG-660 - Modifications and Additions to Metallographic Cell - Radiometallurgy Building (Con't)

Total Authorized Funds: \$135,000
Total Estimated Cost: \$135,000

Detail design has been delayed pending study of methods to provide remote control of metallograph for the cell. The study is virtually complete, and the bid package is in preparation.

CG-664 - 3500 Flow Loop - 314 Building

	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:	85%	90%

Directive Completion Date: August 1, 1957
Total Authorized Funds: \$120,000
Total Estimated Cost: \$120,000

Drawings and specifications have been issued for comment. Design is preparing the purchase order for a package unit.

CA-670 - Roof Repairs - Central Stores

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:		100%	100%
Field Progress:			
F.P.	100%	100%	100%

Directive Completion Date: October 31, 1956
Total Authorized Funds: \$26,000 - GE \$2,800 - AEC \$23,200
Total Estimated Cost: \$26,000

A flood test was performed on the office area roof on August 22, 1956. Minor leaks were detected and repaired, thus completing work by the contractor. The project is being closed out.

CG-671 - Improved Calibration Facility - 3745 Building

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:		100%	100%
Field Progress:			
F.P.	100%	90%	70%

Average Manpower:
 F.P. 3

Approx. Accumulated Manpower: (man-days)
 F.P. 170

1102194

DECLASSIFIED

HW-45115 **TOP SECRET**

CG-671 - Improved Calibration Facility - 3745 Building (Con't)

Directive Completion Date: March 1, 1957 Estimated Completion Date 9-28-56
Total Authorized Funds: \$22,500
Total Estimated Cost: \$22,500

The contractor is having difficulty in obtaining the required vertical alignment of the two gamma wells. Lead shielding on wells has checked out adequately.

CG-673 - Replacement of Obsolete Radio-Communications Equipment

Project Preparation: 100% Scoping: 100%

Total Authorized Funds: \$ 1,000
Total Estimated Cost: \$181,000

No authorization has been received on this approved project.

CG-676 - Fuel Element Pilot Plant - Semiworks

	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:	97.5%	98%

Directive Completion Date: September 1, 1957 Estimated Completion 3-1-57 (Target)
Total Authorized Funds: \$400,000
Total Estimated Cost: \$400,000

Scoping, preliminary and detailed design are the responsibility of the Design Section.

Invitations to bid were mailed on August 27, 1956.

CA-677 - Replacement of Thin-Wall Steel Water Lines - FY 1956

	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:	100%	100%

Directive Completion Date: December 31, 1956
Total Authorized Funds: \$29,000 - GE \$3,400 - AEC \$25,600
Total Estimated Cost: \$29,000

Materials are on order. The contractor expects to start construction about September 15, 1956. No progress schedule has been submitted.

Tentative plans are being made to include a water meter pit for installation of meters for the water service to the steam plant in the 700 Area.

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SECRET
Fe-36

~~DECLASSIFIED~~

HW-45115

CG-680 - Corrosion Testing Facilities - 314 Building

Project Preparation: 100% Scoping: 100% Prelim. Design 100%

Total Authorized Funds: \$ 1,900

Total Estimated Cost: \$171,000

Approval of the project proposal is waiting action by Washington-A.E.C.

CA-685 - Alterations to Buildings 325 and 326

Project Preparation: 100% Scoping: 100%

Directive Completion Date: August 15, 1957

Total Authorized Funds: \$23,000

Total Estimated Cost: \$23,000

The project proposal has been approved by the Commission and Directive No. AEC-89 was issued on August 9, 1956, authorizing expenditure of \$23,000. Preparation of design criteria will begin upon receipt of funds from the Commission.

CA-690 - Roof Repairs - 190-D, F, and 186-D Buildings

	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:	100%	100%

Total Authorized Funds: \$ 1,400

Total Estimated Cost: \$28,000

The bid opening was held August 15, 1956. The apparent low bidder was C. C. Hill of Kennewick, Washington (\$13,700). The fair cost estimate was \$18,000. Construction has not yet started.

Management responsibility on this project is being transferred to Project Engineering Unit "C" of the Irradiations Processing Department as of September 1, 1956.

CA-700 - Drilling and Developing of Geological and Hydrological Wells (ER-3154)

Project Preparation: 100% Scoping: 100%

Total Authorized Funds: \$ 750

Total Estimated Cost: \$137,000

The project proposal was approved by the Hanford Operations Office on August 23, 1956. It has been transmitted for Washington D. C. approval.

On September 1, 1956, this project transfers to Construction Engineering with J. Storz as engineer.

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HW-45115

IR-200 - Graphite Machining Facilities - 300 Area

Directive Completion Date: August 1, 1956
Total Authorized Funds: \$18,700 - GE \$4,850 - AEC \$13,850
Total Estimated Cost: \$18,700

Work was completed on August 10, 1956, and physical completion notice for the project was issued on August 17, 1956.

IR-202 - Lighting Improvements - Central Stores - Building 1171

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:		100%	100%
Field Progress:			
F.P.	100%	100%	100% (See Below)

Directive Completion Date: November 1, 1956
Total Authorized Funds: \$17,000 - GE \$1,500 - AEC \$15,500
Total Estimated Cost: \$17,000

Final inspection was held on August 22, 1956, and the work on the initial contract was accepted. The using department requested that additional fixtures be installed in the receiving area of the parts room. The Commission has been requested to accomplish this work as a modification to the contract.

IR-204 - Office Additions to 141-M Building

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:			100%
Field Progress:			
F.P.	100%	30%	30%

Average Manpower: F.P. 3 Approx. Accumulated Manpower: (man-days) F.P. 70

Directive Completion Date: December 1, 1956
Total Authorized Funds: \$15,000
Total Estimated Cost: \$15,000

Construction is proceeding satisfactorily. Completed items are the roof framing, drainage piping, and the floor slab.

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HW-45115

DEI

IR-212 - General Improvements - Central Stores & Transportation Areas (ER-3134)

Project Preparation: 100%

Total Authorized Funds: \$ 1,800

Total Estimated Cost: \$14,000

This informal request was transmitted to the Commission on August 2, 1956, and is awaiting approval.

Job 0069 - Disposal Program - Streets (AEC 152A)

Project Preparation: 100%

Scoping: 100%

Prelim. Design: 100%

	<u>Scheduled</u>	<u>Actual</u>

Detailed Design:

Not Sch.

5%

Directive Completion Date: Not Established

Total Authorized Funds: \$ 12,500

Total Estimated Cost: \$675,000

Field engineering was started on August 14, 1956. Design layout has started with headquarters in Yakima, Washington. A progress schedule has not been submitted to date.

Job 0070 - Disposal Program - Water Meters

	<u>Scheduled</u>	<u>Actual</u>

Detailed Design:

100%

95%

Total Authorized Funds: \$12,200 (G. E. Portion)

Total Estimated Cost: Not Established

Detail design and specifications were completed the week of August 20, 1956, for all components except the 700 Area Industrial Buildings. Detail design for meter installation for the 700 Area Industrial Buildings is expected to be completed the last week of August, 1956. Information for the bid package is being prepared.

1102198

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HW-45115

DEL

Job 0076 - Partition Installation - 306 Building

	<u>Weighted</u>	<u>Actual</u>
Detailed Design:		100%
Field Progress:		
F.P.	100%	100%

Directive Completion Date: August 1, 1956
Total Authorized Funds: \$ 5,000
Total Estimated Cost: \$ 5,000

This work was completed and closed as of July 31, 1956.

Job 0078 - Installation of Concrete Pad at 3730 Building

Directive Completion Date: August 1, 1956
Total Authorized Funds: \$ 250
Total Estimated Cost: \$ 250

This work has been completed and closed as of August 1, 1956.

ER-3139 - Oil, Paint and Solvent Storage Facility - 300 Area

Total Authorized Funds: \$ 750
Total Estimated Cost: \$ 16,000

Manufacturing Department is reconsidering the informal request which the Commission rejected.

ER-3145 - Lunch and Locker Room Facilities - 100-B, D, and F Areas

Project Preparation: 100% Scoping: 100% Prelim. Design: 100%

Total Authorized Funds: \$ 2,000
Total Estimated Cost: \$ 183,500

The project proposal is being held during the phase of General Electric approvals, subject to the reorganization on September 1, 1956.

ER-3152 - Laboratory Facilities for Radiochemical Analysis

Total Authorized Funds: \$ 2,000
Total Estimated Cost: \$ 148,000

A breakdown of project costs of building addition and equipment reveals that the building addition will cost \$100,000 and the equipment \$48,000.

This project will be assigned to W. Fifer of the Irradiation Processing Department as of September 1, 1956.

1102199

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HW-45115

DX

ER-3153 - Public Address Systems - 200 Areas

Project Preparation: 100%

Total Authorized Funds: \$ 2,000
Total Estimated Cost: \$ 48,500

The project proposal will be sent to the Atomic Energy Commission after September 1, 1956.

This project is being transferred to the Chemical Processing Department. R. C. Baker will be the project engineer.

ER-3155 - Fire Protection Facilities - 1717-B, D, F, H and 1704-H Buildings

Total Authorized Funds: \$ 2,000 Scoping: 100%
Total Estimated Cost: \$ 64,000

This project proposal has been in the Financial Department since July 25, 1956. They are expressing the opinion that this proposal should not be submitted to the Commission unless fire protection facilities are also included in the two dormitories which are being moved on ER A-3158.

ER-3157 - Repairs to Power House Chimneys in 100 Areas

Total Authorized Funds: \$ 2,000
Total Estimated Cost: \$ 220,000

The project proposal is being routed for approval signatures within the General Electric Company.

This project transfers to Irradiation Processing Department as of September 1, 1956, with N. F. Fifer as engineer.

ER-3159 - Public Address Systems - 100-B, D, F, and H Areas

Project Preparation: 100%

Total Authorized Funds: \$ 1,000
Total Estimated Cost: \$ 35,000

The project proposal will be sent to the Atomic Energy Commission after September 1, 1956.

This project is being transferred to the Irradiation Processing Department after September 1, 1956. G. L. Swezea will be the project engineer.

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Pa-41

DECLASSIFIED

HW-45115

ER-3165 - Construction Engineering Work on Community Project for Sewage Plant Road

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:		100%	100%
Field Progress:			
F.P.	100%	100%	100%
Total Authorized Funds:	\$ 4,550 - GE \$350 - AEC \$4,200		
Total Estimated Cost:	\$ 4,550		

Replacement of cyclone fence and installation of the new gate is being completed on schedule.

ER-3167 - Chemical Storage Building - 1100 Area

Project Preparation: 100%

Total Authorized Funds: \$ 750

The project proposal is being held by the using department until after September 1, 1956.

ER-3168 - Cylinder Storage Dock - 1100 Area

Project Preparation: 100% Scoping: 95%

Total Authorized Funds: \$ 750

Total Estimated Cost: \$ 52,000

The project proposal is being routed for General Electric approvals.

ER-3169 - Aquatic Biology Storage Building

Prelim. Design: 100%

Total Authorized Funds: Not Authorized for Const.

Total Estimated Cost: \$ 5,000

A work order for \$5,000 was received from the using department for this job. Job No. 0079 was assigned the project. A letter requesting preparation of the bid package was sent to the Atomic Energy Commission on August 23, 1956.

ER-3170 - High Level Exposure Facility - 141-H Building

Total Authorized Funds: \$ 1,500

Total Estimated Cost: \$31,200 (preliminary)

A project proposal is being prepared.

1102201

DECLASSIFIEDER-4001 - Foremen Information Lectures

DEL

Directive Completion Date: August 1, 1956
 Total Authorized Funds: \$ 616
 Total Estimated Cost: \$ 616

The total assignment of 21 lectures was completed with the final lecture on August 1, 1956.

AEC-115 - Additional Richland Water Supply

Detailed Design:

Actual
A 95%*
B 95%*
C 0%
D 95%*

Directive Completion Date: April 30, 1957
 Total Authorized Funds: \$ 1,700,000 - GE \$29,300 - AEC \$1,670,700
 Total Estimated Cost: \$ 1,700,000

*Revised design schedule for total project is in preparation; actual per cent completion for present portion of work authorized to GE totals 82%. Changes in above percentages made to reflect actual conditions.

A. ER-A-3160 - Irrigation System

1. Complete Bid Package information for contract Invitation to Bid for construction of Yakima Pumping Facility was submitted to the Commission on August 15, 1956.
2. Conversion of Irrigation System-Plans and rough draft of specification completed and awaiting comment by the Commission.

B. ER-A-3161 - Additional Hose Bibs

Plans and specifications were completed by design week of August 20, 1956 and have been transmitted to the Commission for comment and approval.

C. ER-A-3162 - Abandon Irrigation Canal

Field survey and design investigations for support of scope of work has been completed. Scope of work is to be submitted to the Commission for their approval prior to start of detail design.

D. ER-A-3163 - Storm Sewers

Plans and specifications have been submitted to the Commission for comment.

AEC-153 - Suburban Land Survey

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Field Progress:			
P.F.	100%	100%	98%

AEC-153 - Suburban Land Survey (Con't)

Directive Completion Date: June 30, 1956
Total Authorized Funds: \$ 25,000 GE \$18,000 - AEC \$7,000
Total Estimated Cost: \$ 25,000

All maps have been submitted for review by the Commission.

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1102203

UNCLASSIFIED

HW-45115

ADVANCE ENGINEERING SECTION
MONTHLY REPORT
August 1956

The plutonium fuel cycle demonstration reactor concepts proposed in preliminary report HW-44703 were reviewed with a delegation from Washington AEC. Comments were favorable to the D₂O moderated case.

A detailed survey of 22 cases of natural uranium power reactors with graphite or D₂O moderators has begun.

J. W. Albaugh

Manager, Advance Engineering
ENGINEERING DEPARTMENT

FW Albaugh:pk

DECLASSIFIED

1102204

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FF-1

EMPLOYEE AND PUBLIC RELATIONS DEPARTMENT

MONTHLY SUMMARY - AUGUST 1956

PERSONNEL PRACTICES SECTION

The number of applicants interviewed in August was 1186 as compared to 985 for July. In addition, 48 new applicants applied by mail. Open, nonexempt, non-technical requisitions increased from 99 at the beginning of the month to 142 at month end. One hundred and twenty-two employees were added to the roll and 175 removed during the month. The separation rate for fiscal month of August was 1.15% and for fiscal month of July .84%. These rates when converted to annual rates are 15.00% and 10.95% respectively. During August, 93 new requests for transfer to other type work were received by Employment and 69 transfers were effected. Attendance recognition awards were distributed to 57 employees in August, including eight who qualified for six-year awards.

There was one employee death during the month of August. One hundred and thirty-seven visits were made to employees confined to Kadlec Hospital, and 21 checks were delivered to employees confined at the hospital or at home. At month end participation in the Pension Plan was 99.1%, in the Insurance Plan 99.6%, and the Employee Savings and Stock Bonus Plan 53.4%. At month end there were 688 non-veterans registered under Selective Service and 766 military reservists were on the roll. Since August 1, 1950, 445 employees have terminated to enter military service, of which 201 have returned, 67 have not claimed re-employment rights, leaving 177 still in military leave status.

One hundred and five adopted suggestions were approved for awards in August resulting in cash awards totaling \$1895 with a total net savings of \$9037. Since the beginning of the 1955-56 season, 298 offers have been extended to BS/MS graduates for the Personnel Development Program. There have been 104 acceptances to date. Acceptances have been received from 101 experienced candidates. To date 801 PhD cases have been considered, 282 have been invited to visit and 149 have accepted invitations to visit.

EMPLOYEE COMMUNICATIONS AND PUBLIC RELATIONS SECTION

A communication program on the reorganization was launched for both employees and the public on August 3. Used to tell the story were the following media: the GE NEWS, Employee News Letters, press releases, a TV film, radio news announcements and the monthly Community News Letter.

In Community Relations plans were completed for the formation of a Community Relations Council; the AEC-GE float appeared in two parades; a program is being set up with the regional and local schools which includes for the first time a regular advertising series in the local high school paper; and a total of four TV stations in the region aired the summer HERE'S TO YOUR HEALTH series produced for the Richland Department of Public Health.

All arrangements for the September Business Review are being coordinated by members of the Section. Preparation of visual aids and other arrangements are proceeding on schedule.

A total of 615 graphics plates were completed during August. Included were 152 charts and graphs for inclusion in reports.

Employee Communications and Public Relations (Contin.)

The month of August was the busiest ever recorded in Photography. It is estimated that average monthly production of prints and slides during 1956 will be 9500 pieces, more than twice the 1954 monthly average. Including identification work, 29,964 prints were produced during August, 1,064 negatives exposed and 317 assignments completed.

UNION RELATIONS SECTION

The signing of patent agreements by the remaining 35% of the employees who are required to sign these forms is still being delayed. Discussions are continuing with both Legal and the Hanford Atomic Metal Trades Council in an effort to resolve the matter.

The extension of the cycle painting program in Richland during the balance of the current season has resulted in the recall of 15 painters who were removed from the rolls due to a force reduction on June 29, bringing the total to 22 of painters who have returned to the Community Section.

On August 3, 1956, the Council directed a letter to the Company reopening the Community Fireman Agreement to negotiate a wage adjustment. We have since prepared a draft supplemental agreement which would establish a salary pattern for the Community Firemen similar to the pattern in our other bargaining units. The draft proposal is currently being reviewed by Legal.

Arbitration of the issue involving the propriety of a one-day disciplinary suspension given each of two mechanics in Transportation Section has been scheduled for September 11.

SALARY AND WAGE ADMINISTRATION SECTION

A representative of this Section spent three weeks of August in reconciliation work with other Company components located in the East.

All July and August salary review increases have been recorded. Salary record cards have been sorted according to the new organization and work on sorting salary folders is in progress.

Wage Rate Manuals, both Non-Bargaining Unit and Bargaining Unit, have been revised in accordance with the cost-of-living adjustment effective July 30.

Data were prepared for the current Los Alamos survey on research and development positions.

A guide which outlines history of job evaluation for GE and HAPO, plus outline of policy, procedures and practices at HAPO, was completed for use of wage administration personnel of the new organization.

Approval was received from the Commission for establishment of three new nonexempt classifications for use in operation of the electronic data processing equipment.

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Salary and Wage Administration Section(Contin.)

Questionnaires for the 1956 Northwest Area Wage Survey were mailed to participants with the request that they return the completed questionnaires by August 20. As of this date only 35% have been received.

Data were supplied to the National Lead Company in connection with their wage and salary survey.

Revisions to the Salary Administration Manual required by the proposed re-organization of HAPO have been completed and submitted to appropriate Company officials and to the Commission for approval.

EDUCATION AND TRAINING SECTION

There were four additions to the Personnel Development Program for Nuclear Energy during the month of August. Three new graduates are expected to report during September. This will conclude the new hires on the spring recruiting program with the possible exception of one or two new graduates reporting during the remainder of the year. We expect several new graduates to report after mid-term graduation in January, February and March.

Additional consideration has been given to the program designed to enhance the loyalty of new graduates. This will probably take the form of required reading of the book MEN AND VOLTS and discussions and printed material on other parts of the General Electric Company. The program will probably also include the scheduling of speakers from other parts of the Company so as to better acquaint new graduates with functions being performed by other parts of the Company.

Registration for Fall classes at the School of Nuclear Engineering began Monday, August 27, 1956, and will continue through the first week of classes -- September 10-14. Nineteen graduate courses and twenty college-level or vocational subjects are offered in the Fall Term. Competent instructors have been obtained for all courses including the special classes in College Algebra, Analytic Geometry, General Chemistry and General Physics II, offered for the first and second year trainees on the Technician Training Program.

A course announcement listing all Fall courses and tentative Spring courses has been prepared and distributed to all exempt and non-exempt personnel. A full page announcement and story has been published in the GE NEWS. For a few courses, the School has prepared information on the specific course to be posted in various shops in the plant where the possible students are located.

An increasing number of employees have inquired about taking enough undergraduate courses in the School to obtain an engineering degree. The School offers just a few courses that will help these people. Due to this situation some employees are investigating work possibilities at other GE locations or with other companies where it is possible to work towards a BS degree by taking evening courses. It is felt that some study of this situation should be made in order to reduce the number of terminations for this cause.

HEALTH AND SAFETY SECTION

Treatment was continued for one employee who accidentally inhaled plutonium on June 18, 1956.

Preparation for moving the Industrial Medical facilities were continued and negotiations for procurement of necessary services from Kadlec Methodist Hospital have been carried out.

Dispensary service in the 700 Area was discontinued September 1. These services will be made available in the Medical Dental Building.

There was one disabling injury resulting from an automobile accident during the month. There were 320 medical treatment cases for the plant and 12 for the community.

Communicable disease reports fell off to a new low for the year, the 25 cases reported representing a 44% decrease from the total reported in July. Two of these cases were polio, both in adult women. Both cases were mild, non-paralytic.

AUXILIARY OPERATIONS AND PLANT PROTECTION SECTION

There were six fire alarm responses to date during the month, including one minor grass fire and two false alarms. The only loss involved was private. It occurred on August 3, 1956, in 100-K Area. Construction employees welding in the 1704-K building had a minor fire in the morning which they assumed extinguished by using a CO₂ extinguisher. This was not reported to the Fire Department. It apparently became rekindled at 5:28 PM of the same date, causing a private loss estimated by AEC at \$150.00, by contractor Lewis Hopkins at \$725.00.

Total unaccounted for documents increased by one for a total of 193.

Security violations increased from 12 in July to 17 in August.

The selective reinvestigation program was continued during the month with a total of approximately 70% of the questionnaires having been returned.

A comprehensive study of Plant Telephone Service Costs was completed and a report on the results of the study was transmitted to the Hanford Operations Office on August 16.

New telephone answering turrets were installed during the month in the 100-D, 100-F and 100-H Area patrol radio rooms to provide improved communication facilities for area patrol operations.

COMMUNITY SECTION

There was a net reduction of three in the number of businesses in operation at the month's end. There are now 240.

For the year to date, 3618 homes have been given complete fire inspection with 1,029 hazards reported. There was an unusual amount of call-out time during the month due to electrical storm and wind damage. There was one general power outage lasting 15 minutes in the northwest quarter of town due to a tree blowing across the main line feeding that area.

PERSONNEL PRACTICES SECTION

August, 1956

	<u>July, 1956</u>	<u>August, 1956</u>
Applicants interviewed	985	1,186

187 of the applicants interviewed during August were individuals who applied for employment with the Company for the first time. In addition, 48 applications were received through the mail.

	<u>July, 1956</u>	<u>August, 1956</u>
Open Requisitions		
Exempt	--	--
Nonexempt	99	142

Of the 99 open, nonexempt, nontechnical requisitions at the beginning of the month, 65 were covered by interim commitments. Of the 142 open, nonexempt, nontechnical requisitions at month end, 80 were covered by interim commitments. During August, 121 requisitions were received requesting the employment of 185 nonexempt, nontechnical employees.

	<u>July, 1956</u>	<u>August, 1956</u>
Employees added to the rolls	133	122
Employees removed from the rolls	<u>94</u>	<u>175</u>
NET GAIN OR LOSS	/ 39	- 53

	<u>Fiscal Month</u> <u>July, 1956</u>		<u>Fiscal Month</u> <u>August, 1956</u>	
	<u>Male</u>	<u>Female</u>	<u>Male</u>	<u>Female</u>
Separations Rate:	.58%	2.02%	.78%	2.85%

	<u>Fiscal Month</u> <u>July, 1956</u>	<u>Fiscal Month</u> <u>August, 1956</u>
Over-all Separations Rate	.84%	1.15%

During August, 24 employees left voluntarily to accept other employment and 4 left to enter military service.

Transfer Data

Accumulative total of requests for transfer received since 1-1-56	528
Number of requests for transfer received during August	93
Number interviewed in August, including promotional transfers	79
Transfers effected in August, including promotional transfers	69
Transfers effected since 1-1-56, including promotional transfers	396
Number of stenographers transferred out of steno pool in August	14
Transfer requests active at month end	430

ADDITIONS TO THE ROLLS

	<u>Exempt</u>	<u>Nonexempt</u>	<u>Community Firemen</u>	<u>Total</u>
New Hires	9	73	--	82
Re-engaged	-	16	--	16
Reactivates	3	19	--	22
Transfers	<u>2</u>	<u>--</u>	<u>--</u>	<u>2</u>
Total Additions	14	108	--	122

TERMINATIONS FROM THE ROLLS

	<u>Exempt</u>	<u>Nonexempt</u>	<u>Community Firemen</u>	<u>Total</u>
Actual Terminations	28	96	--	124
Removals from rolls (deactivates)	2	39	--	41
Transfers	<u>6</u>	<u>4</u>	<u>--</u>	<u>10</u>
Total Terminations	36	139	--	175

GENERAL

	<u>7-1956</u>	<u>8-1956</u>
Photographs taken	246	284
Fingerprint impressions	131	215

PERSONNEL SECURITY QUESTIONNAIRES PROCESSED

	<u>7-1956</u>	<u>8-1956</u>
General Electric cases	64	126
Facility cases	<u>23</u>	<u>13</u>
Total	87	139

Individual test results were discussed with those who participated in the Secretarial Selection Program. All twenty-two subjects expressed keen interest in knowing their test results and seemed to appreciate the review.

The Minor Construction force reduction of 36 employees was accomplished as follows:

- 6 Employees accepted employment with the J. A. Jones Company and were laid off for lack-of-work.
- 28 Employees were placed in other positions with General Electric.
- 1 Employee is on Illness Absence
- 1 Employee resigned

Because of delay in the disposal program, the Community Section, Maintenance and Renovation Unit found it necessary to continue the exterior painting program. Therefore the 18 painters who were laid off for lack-of-work at the end of June were recalled and of this number 15 have already returned to their former positions. Sixteen painters had been transferred to other positions in lieu of lay-off and were offered a chance to return to their former seniority group. Seven elected to return to their former positions and nine rejected the opportunity, as they preferred to remain on their new assignments.

INVESTIGATIONS STATISTICS

	<u>7-1956</u>	<u>8-1956</u>
Cases received during the month	90	158
Cases closed	46	51
Cases found satisfactory for employment	66	123
Cases found unsatisfactory for employment	-	1
Cases closed before investigation completed	-	-
Special investigation conducted	2	-

Perfect Attendance Recognition Awards

Total one-year awards to date since January 1, 1950	5763
One-year awards made in August	14
Total two-year awards to date since January 1, 1950	3374
Two-year awards made in August	7
Total three-year awards to date	2063
Three-year awards made in August	11
Total four-year awards to date	1140
Four-year awards made in August	9
Total five-year awards to date	429
Five-year awards made in August	8
Total six-year awards to date	66
Six-year awards made in August	8

Service Recognition

Total Service Recognition Pins presented to date	6413
Five-year Service Recognition Pins presented during August to-Exempt Personnel	25
Five-year Service Recognition Pins presented during August to Nonexempt Personnel	83
Ten-year Service Recognition Pins presented during August to Exempt Personnel	4
Ten-year Service Recognition Pins presented during August to Nonexempt Personnel	1

During August, 14 people whose continuity of service was broken while in an inactive status were so informed by letter.

The following contacts were made with employees during the month of August:

Employee contacts made at Kadlec Hospital	137
Salary checks delivered to employees at Kadlec Hospital	21
Salary checks delivered to employees at home	0

Six employees retired during the month of August, namely:

George W. Burn	W-4975-6437	Normal Retirement
William Gardner	W-15901-6435	" "
Joe B. White	W-7195-4641	" "
Ethel E. Cassady	W-5703-6371	Optional Retirement
Frank S. Robinson	M-12741-7302	" "
Edward J. Sullivan	M-1312-5476	" "

All matters pertinent to retirement have been discussed with these employees in order that they will be fully informed of their retirement benefits.

Three retired employees expired during the month:

Emett E. Foster	W-6021	8-19-56
William B. Jewett	W-2357	8-18-56
Pierce D. McWaters	W-7789	8-5-56

All necessary arrangements will be made to settle matters of business existing between the Company and beneficiaries of the deceased.

One employee expired during the month, namely:

Margaret N. Schafer	W-9114	8-31-56	Manufacturing

All necessary arrangements will be made to settle matters of business existing between the Company and beneficiaries of the deceased.

Since September 1, 1946, 198 life insurance claims have been paid totaling \$1,420,427.00.

Ninety-four new employees attended Orientation Programs given by members of this group during the month. Six of the new employees are temporary and therefore were not eligible for the Insurance or Pension Plan. Of the 88 eligible employees, 97% have signed up to participate in the Insurance Plan, 93% have signed up to participate in the Pension Plan, and 90% have signed up to participate in the Good Neighbor Fund.

Twenty-nine letters were written in regard to matters concerning deceased employees.

At the end of the month, participation in the Employee Benefit Plans was as follows as compared with last month's participation:

	<u>JULY</u>	<u>AUGUST</u>
Pension Plan	99.0%	99.1%
Insurance Plan	99.6%	99.6%
Savings & Stock Bonus	54.4%	53.4%
Good Neighbor Fund	71.2%	71.7%

Total number of non-veteran employees subject to military service training through Selective Service System

688

Number Classified 1A	171
Number Classified 1AO	1
Number Classified 1D	61
Number Classified 2A	112
Number Classified 3A	234
Number Classified 4A	4
Number Classified 4F	91
Number Classified 2S	13
Number Classified 4D	<u>1</u>
	688

Number of Technically Trained & Engineering Personnel for whom deferments are currently being requested

130

Number of Non-Technically Trained & Engineering Personnel for whom deferments are being requested

6
136

Accumulated total of deferments requested

1707

Accumulated total of deferments granted

1371

Current number of deferment requests pending

39

Current number of deferment requests denied

3

Current number of deferment requests granted

17

During Month of August

Number of deferment requests pending at Local Board level	32
Number of deferment requests pending at Appeal Board level	6
Number of deferment requests pending at Presidential Appeal level	1
Total	39
Number of deferment requests denied by Local Boards	3
Number of deferment requests denied by State Appeal Boards	0
Number of deferment requests denied by Presidential Appeal Board	0
Total	3
Number of deferments granted by Local Boards	17
Number of deferments granted by State Appeal Boards	0
Number of deferments granted by Presidential Appeal Board	0
Total	17
Number of Technically Trained & Engineering Personnel, denied, or requesting no further appeal, now pending induction	0
Number of Technical Graduates with over two years of deferments	72
Number of Selective Service vulnerable Technical Graduates enlisted	1
Number of Selective Service vulnerable Technical Graduates drafted	0
Number of Technical Graduates called to active duty under R.O.T.C.	2
Reservists Data - Total Number of Reservists on Roll	
Number of Active Reservists	180
Number of Inactive Reservists	565
Number of employees in the National Guard	21
Total	766
Reservists and National Guard members subject to drills, tours of duty, Cruises, Summer Camp and/or Weekly or Monthly Meetings	271
Military Service Leaves of Absence - August 1, 1950 thru August 31, 1956	
Reservists	137
Selective Service System	299
Female Employees Enlisted	9
Total	445

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Total number returned to roll 201

Reservists 86
 Sel. Sev. Sys. 115
 201

Known number not claiming reemployment rights 67

Number of employees still on military leaves 117

Suggestion Plan

	<u>July</u>	<u>August</u>	<u>Total Since</u> <u>7-15-47</u>
Suggestions Received	259	297	20731
Suggestions Referred to Departments for Investigation	340	297	
Adopted Suggestions Approved by Board for Award	103	105	
Total Net Savings	\$12,588.71	\$9,037.73	
Total Cash Awards	2,035.00	1,895.00	

Cumulative suggestion statistics for the first eight months of 1956, compared with the same period for 1955, are:

	<u>1955</u>	<u>1956</u>	<u>% Change</u>
Received	1923	2248	+16.9%
Adopted	749	742	- 0.7%
% Adopted	38.9%	33%	-15.2%
Awards	\$15,679	\$14,090	-10.1%
Savings	117,646.42	82,615	-29.8%
Award/Savings	16.6%	17%	+ 0.2%

Life Insurance

Thirty-five requests for code information were received from insurance companies and investigation agencies and furnished during the month of August, 1956. The code information is supplied in accordance with a prearranged plan whereby employees of this project may be insured on the same basis of those working elsewhere.

Insurance Statistics

Claims reported to Department of Labor
and Industries

<u>July, 1956</u>	
<u>Long Forms</u>	<u>Short Forms</u>
39	351

<u>August, 1956</u>	
<u>Long Forms</u>	<u>Short Forms</u>
35	360

Total since September, 1946 - 33,879

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Claims reported to Travelers

July
6

August
0

Operations - Workmen's Compensation Claims

Robert L. Koger - Claim No. 8000132 - Date of Injury: October 15, 1946;
Employer: General Electric Company; Nature of Injury: Acid burns on
right side of head, neck and right ear.

Following his injury, Mr. Koger received extensive medical treatment, including plastic surgery. The claim was finally closed by the Department of Labor and Industries, with allowance for medical treatment only. Mr. Koger then appealed to the Board of Industrial Insurance Appeals, contending that he has a number of disabilities, as a result of the acid burns, including cosmetic disfigurement. At a conference in May, 1956, it was agreed that he should be sent to a commission of doctors in Richland for examination and evaluation of his condition. At a second conference before the Board in Richland, on August 9, 1956, the reports were discussed, and no settlement or agreement could be reached. Accordingly, the case will be set for hearing before the Board at some future date.

Construction - Workmen's Compensation Claims

W. E. Taylor - Claim No. 9007629 - Date of Injury: Indefinite;
Employer: V. S. Jenkins; Nature of Injury: Alleged Asbestosis.

Mrs. W. E. Taylor applied for a pension from the Department of Labor and Industries following the death of her husband. During his lifetime, Mr. Taylor had filed a claim for a condition described by him as, "a gradual decrease in lung power." After allowance of the widow's pension, General Electric appealed to the Board of Industrial Insurance Appeals on the basis that Mr. Taylor's employment at Hanford was not responsible for his death and, even if it were shown that the death resulted from exposure to asbestos and that his employment at Hanford contributed to his condition, the cost of the widow's pension should be apportioned among several employers and not charged entirely to the Hanford employer. A hearing on the case was held in Portland on August 1, 1956. The widow's case was concluded with presentation of the testimony of two doctors. The case will be continued to Richland for testimony on behalf of the employer.

Lowell B. Patterson - Claim N. 9002493 - Date of Injury: June 21, 1948;
Employer: Atkinson & Jones; Nature of Injury: Tumor on Chest.

Mr. Patterson appealed to the Board of Industrial Insurance Appeals following closure of his claim by the Department of Labor and Industries with no allowance for a permanent partial disability award. The claim has a long history, and has been before the Superior Court on two occasions. The first time the Superior Court held that an injury occurred in the course of Mr. Patterson's employment and the second time the Superior Court determined that Mr. Patterson was not entitled to time

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loss payments as a result of treatment at a "quack" cancer sanitorium in Missouri. At the last hearing, the Board Examiner sustained an objection to any medical testimony on the claimant's behalf pertaining to permanent partial disability as a result of the "quack" treatment, and the case went to the Board for an order substantially on the record, as made, to that point. On August 6, 1956, we received the Board's "Decision and Order" sustaining the closure of the case with no allowance for a permanent partial disability award.

Dixie A. Kirkland - Claim No. 9000288 - Date of Injury: January 13, 1944; Employer: du Pont; Nature of Injury: Multiple Injuries to the Back and Left Side.

Mr. Kirkland appealed to the Board of Industrial Insurance Appeals after his request for a reopening of his claim was denied. During the preparation of the case, it was learned that he had filed claims for the same condition for which he was contending disability with various insurance companies and also under the Longshoremen and Harbor Worker's Act. Motion pictures were taken of him lifting, bending, and using his arms, and the pictures were shown at a hearing before the Board. Mr. Kirkland admitted filing the other claims, and the motion pictures provided clear evidence that his back condition was not as he had alleged. After receipt of the evidence, the Board issued its "Decision and Order" sustaining the denial of Mr. Kirkland's application to reopen his claim. On August 20, 1956, he appealed to the Superior Court for King County.

Liability Insurance

Merle T. Powell vs. General Electric Company - Claim B-6835907.

Mr. Powell, a janitor in the Reactor Section, filed a Summons and Complaint contending loss of vision in his right eye as a result of an injury allegedly sustained when he was struck by an ash tray thrown by a fellow workman. The complaint alleged damages in the amount of \$25,000. The case was set for trial in the United States District Court for Southeastern Washington, in Yakima, on December 28, 1955. At that time, both the plaintiff and the defendant agreed to stipulate to a dismissal of the plaintiff's case without prejudice but with imposition of costs in the amount of \$118.87. Mr. Powell's attorney advised, at that time, that we could expect a new action within a short time, setting out the same allegations as contained in the previous Summons and Complaint. The time for filing a new action has since elapsed, and the claim is barred by the Statute of Limitations. Accordingly, the matter may be considered closed, with the exception of recovering the \$118.87. We have advised The Travelers that we feel the money should be obtained from Mr. Powell.

Personnel Development Program

A. M. Anderson, H. W. Gouldthorpe and J. B. Holmes visited Hanford during the month to discuss the feasibility of a Western Training Program with assignments available at Hanford, San Jose and ANP at Idaho Falls. Although no firm proposal has been made as to the mechanics of such a program, further follow up planned.

During the reporting period one acceptance and three rejections were received and four people reported on the rolls.

At the close of the current recruiting year, eight cases will be carried over with next year's statistics. These include six acceptances not on the roll and two open offers.

The status of this Program is summarized in the following table by fields:

	<u>Offers Extended</u>			<u>Acceptances</u>			<u>Open Offers</u>			<u>Rejections</u>			<u>On the Roll</u>
	<u>BS</u>	<u>MS</u>	<u>Total*</u>	<u>BS</u>	<u>MS</u>	<u>Total*</u>	<u>BS</u>	<u>MS</u>	<u>Total*</u>	<u>BS</u>	<u>MS</u>	<u>Total</u>	
<u>Engineering</u>													
Chemical	78	5	83	27	1	28	1	-	1	50	4	54	25
Electrical	36	-	36	12	-	12	-	-	-	24	-	24	12
Mechanical	69	2	71	18	-	18	-	-	-	51	2	53	18
Metallurgical	10	1	11	3	-	3	-	-	-	7	1	8	3
<u>Science:</u>													
Chemistry	24	5	29	13	3	16	-	-	-	11	2	13	14
Physics	36	5	41	12	2	14	1	-	1	23	3	26	14
<u>Other</u>	<u>25</u>	<u>2</u>	<u>27</u>	<u>12</u>	<u>1</u>	<u>13</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>13</u>	<u>1</u>	<u>14</u>	<u>12</u>
TOTALS	278	20	298	97	7	104	2	-	2	179	13	192	98
<u>Business</u>													
Grads	4	-	4	3	-	3	-	-	-	1	-	1	3

*Offers and Acceptances totals include 9 carry-over offers from the 1954/55 season of which 8 were acceptances not on the roll as of 9/1/55.

Summer Program

	<u>Offers</u>		<u>Rejected</u>	<u>OTR</u>
	<u>Extended</u>	<u>Accepted</u>		
Summer Juniors	18	14	4	14
Grad Students	18	10	8	10
Summer Professors	14	12	2	12

Experienced BS/MS Recruiting

A meeting was held with the Employee Relations managers of the new organizations to discuss recruiting problems that will be encountered under the proposed organization. It was agreed that the Technical Personnel Placement Unit of the Relations and Utilities Operation should act as a coordinating unit for BS/MS experienced recruiting efforts. Tentative procedures were drawn up following the meeting and have been recently distributed for approval.

There were a total of 65 cases considered during the month of August with 15 invitations to visit being made and 10 experienced candidates visiting the Hanford Operation. Ten employment offers have been extended with five offers accepted and eleven people placed on the roll.

At the close of the 1955-56 recruiting year, there are six open offers to be carried over for next year's statistics and four acceptances not on the roll as of September 1, 1956.

The following summarizes this activity to date:

	INVITATIONS					OFFERS			
	Cases Consid.	Ext.	Visited	To Visit	Open Invitations	Ext.*	Acc.*	Open	OTR
Engineering:									
Chemical	130	23	19	--	--	19	14	--	14
Electrical	100	25	20	1	--	21	10	--	10
Mechanical	227	49**	32	1	6	30	14	--	14
Industrial	52	6	5	--	--	4	4	--	4
Metallurg.	58	11	7	--	1	7	4	--	4
Civil	32	4	3	--	--	4	4	--	4
Geological	9	2	2	--	--	3	3	--	3
Science:									
Chemistry	155	17	12	--	1	20	13	--	13
Physics	102	25	11	--	1	8	3	1	3
Math-Stat.	120	15	9	--	--	10	7	1	5
Other:	<u>655</u>	<u>27</u>	<u>22</u>	<u>--</u>	<u>2</u>	<u>41</u>	<u>25</u>	<u>4</u>	<u>23</u>
Totals	1,640	204	142	2	11	167	101	6	97

*Offer total include 24 carry-overs from the 1954-55 season of which 20 were acceptances not on the roll as of 9/1/55, and 4 were open offers at that time.

**Error of 1 made on report of 8/23/56.

Ph.D. Recruiting

This activity for the month of August may be summarized as follows:

New Applicants	152*
Invited	8
Accepted invitation	4
Visited	12
Offered	4
Accepted offer	1
On the roll	2

*This figure reflects the margin of error disclosed in reviewing the records for Ph.D. recruiting for the year.

The year end results of this activity for the 1955-56 season may be compared with the 1954-55 season as follows:

	1955-56	1954-55
Candidates	812	606
Invited	284	230
Accepted	149	129
Visited	135	114
Offered	51	51
Accepted offers	10	20
On the roll	13	13

Terminations and Transfers

During the month of August we have had 50 terminations of technical and/or exempt personnel. Eight employees transferred to other GE sites, three entered military service, twelve resigned for other employment, 24 terminated to return to school (this figure includes people hired on the Summer Program), one employee exercised the right of optional retirement, one was removed from the payroll due to lack of work, and one terminated to seek employment elsewhere.

We received 11 requests for transfers during August. The reasons for these requests are as follows:

One is concerned about reductions in force in the 200 areas.

One is interested in position offered by Electronics Park, Syracuse.

One is interested in exploring employment possibilities both within and without the Company.

One wishes to remain with G.E. after the disposal of the hospital.

One is interested in working for I.G.E.

Two are seeking locations where they and their families will not be subject to the allergies that they suffer from in this area.

Two wish to explore possibilities in the California area.

Terminations and Transfers (Continued)

Two wish to relocate in the California area because of preference for that location and because of the housing situation in Richland.

18 transfer cases were made inactive in August. This figure includes three who are remaining on their present assignments in addition to the terminations listed above. The three who entered military service did not of course contact this office.

EMPLOYEE COMMUNICATIONS AND PUBLIC RELATIONS

A total of 43 releases were sent out during the month. The breakdown by category, distribution and content was as follows:

<u>SUBJECT</u>		<u>DISTRIBUTION</u>	
Administration and legal	4	Hanford Area	26
Organization changes	5	West Coast	11
Employee benefits and pay	6	National	6
Employment services	5		
Utilities and public works	2	<u>CONTENT</u>	
Plant services	1		
Safety	1	Information	3
Hanford atomic science series	5	Pictures	3
Technology and research	7	Short	33
Education and library	4	Long	4
Good Will	2		
Richland and Hanford protection	1		

<u>Figures to Date</u>	<u>Local Releases</u>	<u>Regional</u>	<u>National</u>
1955	235	44	78
1956	244	98	31

Locally the big story of the month was the reorganization of Hanford. A communication program on the reorganization was launched for both employees and the public on August 3. Included in the program for employees' information, which extended throughout the month of August, were an Employee News Letter from the HAPO General Manager and a series of pages in the GE NEWS containing organization charts, functional statements, biographical sketches of the level 2 and level 3 managers and a feature story or statement from the department or operation managers regarding the work of the component.

Releases for the area and regional press were made for publication on August 3. The regular monthly News Letter to community leaders featured the reorganization story as well.

In addition, a news type film featuring the HAPO General Manager and those reporting to him was produced and released for showing to local and regional TV audiences on August 3. An announcement was also carried by local radio stations.

An informal survey of plant reaction to the initial announcement stories on the reorganization indicate that a good communication job had apparently been done in the field before the GE NEWS announcement was made, as most employees already knew the basic facts and now were interested in the particulars of the reorganization.

A number of activities were pursued during the month which contribute toward the realization of our Community Relations objectives. The AEC-GE float made its first appearance in the Atomic Frontier Days parade, and its second appearance in the Kennewick parade. Plans were completed for the organizing of a HAPO Community Relations Council. The first meeting will be September 10.

EMPLOYEE COMMUNICATIONS AND PUBLIC RELATIONS

With the opening of the school year, schools in the area have been contacted to encourage the use of GE educational aids in their programs. A program to foster good relationships between the Company and the local schools has also been set up. This year for the first time the Company will run a series of nine advertisements in the local high school paper.

KHQ-TV in Spokane and three other regional television stations have been telecasting the summer HERE'S TO YOUR HEALTH films produced for the Richland Public Health Department. A letter of commendation regarding the series was received from a member of the staff of KHQ-TV which is an NBC affiliate. Script preparation of a winter series on health has begun.

The Hanford-produced film, HANDS ACROSS THE ATOM, has been scheduled by Public Relations in Schenectady for showing at the Atomic Fair in Chicago on September 24. It is also scheduled for national telecast on the National Association of Manufacturers' INDUSTRY ON PARADE series.

Work is proceeding with the preparation of graphics material for the Business Review to be held during September. At the present time, the material prepared for this Review consists of 68 slides and six visual aids. All arrangements for the Review are being coordinated with various members of the Section.

Among other graphics assignments undertaken during the month were: the preparation of 152 charts and graphs for inclusion in reports; completion of 18 slides for off-site meetings; preparation of 36 charts to cover the 1956 Radiation Attitude Survey of Reactor; and the completion of 221 place cards and name tags for luncheons and dinners.

In addition, work is continuing on the construction of a permanent display including a model of a Hanford type reactor. It first will be displayed in the Lobby of the Desert Inn during the period of the Business Review.

A complete breakdown of Graphics assignments for the month is included below:

<u>Distribution of Graphics August assignments</u>		<u>Percent</u>		
General Administrative (Including Operations Research)			2	
Employee and Public Relations			20	
Engineering			31	
Manufacturing			10	
Financial			9	
Radiological Sciences			28	
Atomic Energy Commission			--	
	<u>July</u>	<u>August</u>		
Total assignments completed	49	39		
Total assignments backlog	24	30		
	<u>Graphs or</u>	<u>Illustrations</u>	<u>Other</u>	
	<u>Charts</u>			
Report Material (Includes Technical Publications)	131	2	2	
Technical or Scientific Illustrations	12	19	--	

EMPLOYEE COMMUNICATIONS AND PUBLIC RELATIONS

Mechanical Art (Flow charts, schematics, maps, etc. - not for publication)	47	--	--
Lecture Material (Includes plates for slides)	84	--	23
Posters	--	--	--
General (Posting of current data, assembly, revisions, etc.)	<u>57</u>	<u>--</u>	<u>238</u>
	331	21	263

Total plates completed - 615

The month of August proved to be a heavy one in Photography, the busiest ever recorded both as to number of photographs completed and charges made to customer components.

The previous high for Photography excluded ID work, was 12,774 slides and prints. Figures for August show that 18,593 prints and slides were produced (excluding ID work). In May of this year \$12,206.00 was liquidated; in August \$14,110.26 was liquidated. It is estimated that average production per month during 1956 will be 9500 slides and prints a month, more than twice the 1954 monthly average.

Part of the increase for the month of August can be attributed to the production of material for technical reports, which requires only laboratory work. The 300 Area laboratory accounted for over half of the liquidations for the month.

As the attached statistical report shows, a total of 29,964 prints, including ID, were produced. A total of 317 photographic assignments were covered, 1,064 negatives exposed and 25,964 prints produced.

A complete analysis of photographic assignments is included on the attached breakdown.

PHOTOGRAPHY MONTHLY REPORT AUGUST, 1956	T	I. D.	2" X 3"	4" X 5"	5" X 7"	8" X 10"	6" X 11"	11" X 11 1/2"	16" X 20"	N E G.	35mm COLOR SLIDES	35mm B&W SLIDES	3 3/4" X 4 1/4" COLOR SLIDES	4 1/4" X 4 1/4" B&W SLIDES	16mm M.P. FILM
4100 SALARY & WAGE ADMIN.	9														
4200 PERSONNEL PRACTICES	5					25				30					
4300 EDUCATION & TRAIN.		8				23	2			18				10	
4400 EMP. COMM. & PUBL. RELATIONS		182	97	73	492			1		372					2,900
4500 UNION RELATIONS	12														
4600 AUXILIARY OPER. & PLANT PROTECT.	7,371		24												
4700 COMMUNITY	8	80		2	2							4			
4800 HEALTH & SAFETY				2											
5100 ADVANCE ENGR.										2	1				
5300 DESIGN			6	2	56	132				41					
5400 PROJECT	6		12	5	78	141				84					
5500 ENGR. ADMIN.						348			348	3			2		
5700 PILE TECH.	234		846	346	25	12,762			15	328				22	
5800 SEPARATIONS TECH			6			374				38				29	
6000 MANUFACTURING	58					16				4					
6100 REACTOR	183					12	156			50					400
6200 SEAPAATIONS			34				434	11							
6300 METAL PREP.			15	124			49			16					
6400 T. PLANT						6	4			11					

1102225

PHOTOGRAPHY UNIT
MONTHLY REPORT
AUGUST, 1956

[illegible]

8,085	270	1,070	554	921	14,609	2	.364	1,064	1	4	5	79	3,300

JUNE

JULY

AUGUST

TOTAL ASSIGNMENTS	317	1,295	311
TOTAL NEGATIVES	1,064	1,113	842
TOTAL PRINTS	25,964	17,795	19,625

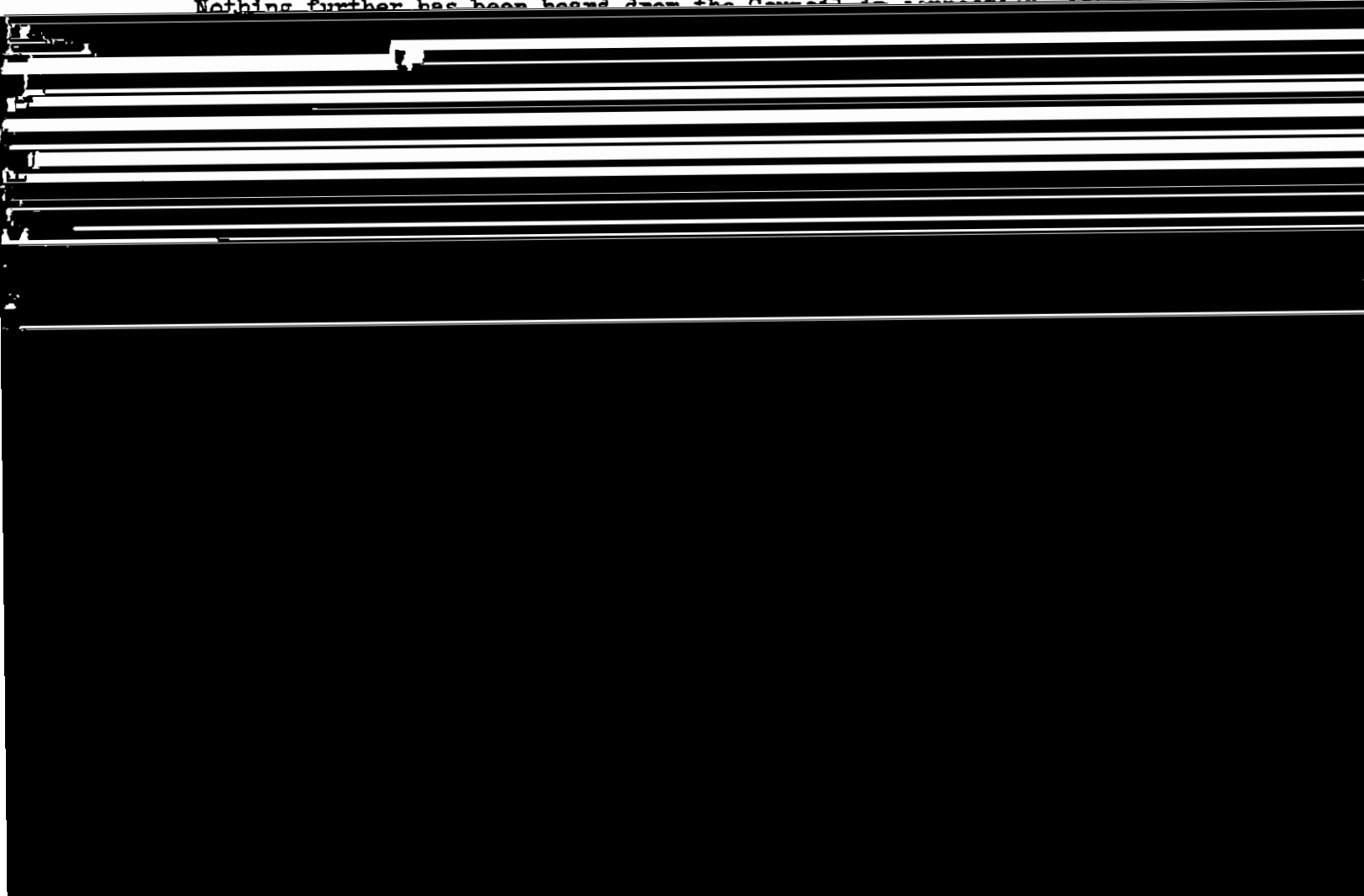
UNION RELATIONS SECTION

August, 1956

The signing of patent agreements by the remaining 35% of the employees who are required to sign these forms is still being delayed. The inaction stems from the conclusion of the Legal Department that the Hanford Atomic Metal Trades Council's position as expressed in their letter dated August 3, 1956 could cause the signed agreements to be invalid as far as bargaining unit employees are concerned. Legal feels that the patent agreements would be subject to collective bargaining if the Council so desired. On the other hand, it is the intention of the Company as a whole to avoid such negotiations and there is no history in the Company of such negotiations. Discussions are continuing with both Legal and the Council in an effort to resolve the matter.

The extension of the cycle painting program in Richland during the balance of the current season has resulted in the recall of 15 Painters who were removed from our rolls due to a force reduction on June 29. In addition, seven (7) of the 16 Painters who had accepted lower rated jobs in lieu of layoff have elected to return to the Painter classification. This represents a total of 22 Painters who have returned to the Community Section. All Painters who were either removed from the roll or assigned to other work due to the June 29 layoff have been given an opportunity to return and all who are interested in returning have presumably already done so.

Nothing further has been heard from the Council in connection with this



Grievance Statistics:

A total of forty (40) grievances were received and five (5) Step II grievance meetings were held during the month. A breakdown of the grievances received and processed follows:

<u>ALL DEPARTMENTS</u>						
	<u>HAMTC</u>	<u>HGU</u>	<u>BSEIU</u>	<u>Total Unit</u>	<u>Total Nonunit</u>	<u>Total</u>
Received this month	40	0	0	40	0	40
Received this year	326	4	0	330	16	346
Received 1955 through this month	335	3	1	339	15	354
Step I						
Pending July 31	0	0	0	0	0	
Settled this month*	29	0	0	29	0	29
Settled this year	223	3	0	226	4	230
Pending August 31	0	0	0	0	0	
Step II						
Pending July 31	43	0	0	43	0	
Settled this month*	12	0	0	12	0	12
Settled this year	121	4	0	125	11	136
Pending August 31	44	0	0	44	0	
Arbitration						
Pending July 31	7	0	0	7	0	
Settled this month	0	0	0	0	0	
Settled this year	0	0	0	0	0	
Pending August 31	5	0	0	5	0	
Total settled this month	41	0	0	41	0	41
Total settled this year	344	7	0	351	15	366

<u>BY DEPARTMENTS</u>						
	<u>Received</u>		<u>Settled Step I*</u>		<u>Settled Step II**</u>	
	<u>This Mo.</u>	<u>This Year</u>	<u>This Mo.</u>	<u>This Year</u>	<u>This Mo.</u>	<u>This Year</u>
Manufacturing						
Reactor - Unit	18	156	14	107	6	56
- Nonunit	0	1	0	0	0	1
Separations - Unit	15	101	12	75	3	39
- Nonunit	0	6	0	2	0	4
Metal Preparation - Unit	6	36	2	25	2	12
Transportation - Unit	0	8	0	3	0	4
Electrical Utilities - Unit	0	1	0	1	0	1
Stores - Unit	0	1	0	0	0	1
Employee & Public Relations						
Community - Unit	0	4	1	4	0	0
Aux. Ops. & Plt. Prot. -Unit	1	15	0	7	1	9
Radiological Sciences - Unit						
- Nonunit	0	8	0	4	0	3
	0	4	0	1	0	2
Engineering - Nonunit						
	0	3	0	0	0	3
Financial - Nonunit						
	0	2	0	1	0	1
* TOTAL	40	346	29	230	12	136

* See note on next page

* Grievances brought to Step II prior to June 1, 1956, but never processed by the union are, for the purpose of this report, considered settled at Step I.

** Grievances which the union formally indicated their intention to submit to arbitration, but have taken no further action since June 1, 1956, are, for the purpose of this report, considered settled at Step II.

BY SUBJECT

Unit	<u>Manufacturing</u>		<u>Emp. & Pub. Relations</u>		<u>Radiological Sciences</u>		<u>Engineering</u>		<u>Financial</u>	
	<u>This</u>	<u>This</u>	<u>This</u>	<u>This</u>	<u>This</u>	<u>This</u>	<u>This</u>	<u>This</u>	<u>This</u>	<u>This</u>
	<u>Mo.</u>	<u>Year</u>	<u>Mo.</u>	<u>Year</u>	<u>Mo.</u>	<u>Year</u>	<u>Mo.</u>	<u>Year</u>	<u>Mo.</u>	<u>Year</u>
Recognition	0	1	0	1	0	0				
Jurisdiction	23	148	1	6	0	1				
Health-Safety-San.	2	9	0	0	0	0				
Hours of Work	0	4	0	2	0	1				
Overtime Rates	7	75	0	3	0	4				
Vacation	0	3	0	0	0	0				
Seniority	1	16	0	3	0	1				
Wage Rates	1	13	0	1	0	1				
Miscellaneous	3	19	0	3	0	0				
Sick Leave	2	10	0	0	0	0				
Transfer	0	1	0	0	0	0				
Grievance Procedure	0	3	0	0	0	0				
Continuity of Service	0	1	0	0	0	0				
<u>Nonunit</u>										
Wage Rates	0	4	0	0	0	0	0	1	0	1
Miscellaneous	0	1	0	0	0	0	0	2	0	1
Hours of Work	0	1	0	0	0	1	0	0	0	0
Sick Leave	0	1	0	0	0	0	0	0	0	0
Distribution of Over-										
time	0	0	0	0	0	1	0	0	0	0
Job Training	0	0	0	0	0	1	0	0	0	0
Job Assignments	0	0	0	0	0	1	0	0	0	0
TOTAL	39	310	1	19	0	12	0	3	0	2

SALARY AND WAGE ADMINISTRATION SECTION

1. A representative of this Section spent three weeks of August in reconciliation work with other Company components located in the East.
2. All July and August salary review increases have been recorded. Salary record cards have been sorted according to the new organization and work on sorting salary folders is in progress.
3. Wage Rate Manuals, both Non-Bargaining Unit and Bargaining Unit, have been revised in accordance with the cost-of-living adjustment effective July 30.
4. Data were prepared for the current Los Alamos survey on research and development positions.
5. A guide which outlines history of job evaluation for GE and HAPO, plus outline of policy, procedures and practices at HAPO, was completed for use of wage administration personnel of the new organization.
6. Approval was received from the Commission for establishment of three new non-exempt classifications for use in operation of the electronic data processing equipment.
7. Questionnaires for the 1956 Northwest Area Wage Survey were mailed to participants with the request that they return the completed questionnaires by August 20. As of this date only 35% have been received.
8. Data were supplied to the National Lead Company in connection with their wage and salary survey.
9. Revisions to the Salary Administration Manual required by the proposed reorganization of HAPO have been completed and submitted to appropriate Company officials and to the Commission for approval.

EDUCATION AND TRAINING SECTION

AUGUST 1956

PERSONNEL DEVELOPMENT PROGRAM FOR NUCLEAR ENERGY

Present Assignments

<u>Department - Engineering</u>	<u>Last Month</u>	<u>This Month</u>
Pile Technology	23	21
Separations Technology	7	8
Design	7	8
Project	4	2
Engr. Administration	1	1
 <u>Manufacturing</u>		
Metal Preparation	8	7
Separations	5	4
Reactor	29	27
Transportation	1	0
Purchasing & Stores	1	1
Electric Utility	1	1
 <u>Financial</u>		
Procedures & Computing	4	2
 <u>Radiological Sciences</u>		
Biology	2	2
Bio-physics	3	3
Records & Standards	1	1
 <u>Employee & Public Relations</u>		
Education and Training	<u>3</u>	<u>4</u>
Total	100	92

Permanent Placements

There were seven placements off the Program as follows:

Separations Technology	- 1
Pile Technology	- 3
Reactor	- 1
Metal Preparation	- 1
Procedures & Computing	- 1

PERSONNEL DEVELOPMENT PROGRAM FOR NUCLEAR ENERGY (Con't)

Additions

There were four additions to the Program during the month of August. Three new graduates are expected to report during September. This will conclude the new hires on the spring recruiting program with the possible exception of one or two new graduates reporting during the remainder of the year. We expect several new graduates to report after mid-term graduation in January, February and March.

Additional consideration has been given to the program designed to enhance the loyalty of new graduates. This will probably take the form of required reading of the book MEN AND VOLTS and discussions and printed material on other parts of the General Electric Company. The program will probably also include the scheduling of speakers from other parts of the Company so as to better acquaint new graduates with functions being performed by other parts of the Company.

Military Service

There were three losses to the armed forces due to ROTC commitments in college.

PERSONNEL DEVELOPMENT COURSES

The following Personnel Development Courses were presented during the period between July 25 and August 25:

<u>COURSE</u>	<u>NUMBER OF TIMES PRESENTED</u>	<u>NUMBER IN ATTENDANCE</u>
Report Writing	1	15
Customer Relations	1	11
Conference Leading	1	7
Labor Management Relations	1	18
Cost Control	1	15
Job Relations Development	2	19
Effective Human Relations	1	12
Human Relations Conferences for Welding School	1	21

A P.M.S. dinner meeting was held at the Desert Inn Hotel on August 2 for Groups 90, 91 and 92 with 47 in attendance.

SCHOOL OF NUCLEAR ENGINEERING

Fall 1956 Semester

Registration for Fall classes began Monday, August 27, 1956, and will continue through the first week of classes -- September 10-14. Nineteen graduate courses and twenty college-level or vocational subjects are offered in the Fall Term. Competent instructors have been obtained for all courses including the special classes in College Algebra, Analytic Geometry, General Chemistry and General Physics II, offered for the first and second year trainees on the Technician Training Program.

SCHOOL OF NUCLEAR ENGINEERING (Con't)

A course announcement listing all Fall courses and tentative Spring courses has been prepared and distributed to all exempt and non-exempt personnel. A full page announcement and story has been published in the G.E. NEWS. For a few courses, the School has prepared information on the specific course to be posted in various shops in the plant where the possible students are located.

COURSE APPROVALS

Additional approvals on courses have been received from the State College of Washington. Over three-fourths of all courses have been reviewed, and the few that remain were discussed with Mr. Jones when he visited Richland on August 24.

Oregon State College has approved four of the new instructors whose credentials were submitted to each school five weeks ago.

VISITS

Dr. L. C. Cady, Dean of the Graduate School at the University of Idaho, visited Richland to clear up a few items from the activities of the past year and lay plans for the coming year.

Dr. Harry Sorensen, Head of the Mechanical Engineering Department at the State College of Washington, visited Richland on August 20 to discuss with instructors certain courses conducted in the mechanical engineering field.

SEMINAR FOR SUMMER PROFESSORS

On August 13 the last of a series of four seminars was held in W-10 for the professors working at Hanford this summer. Subject matter discussed dealt with metal preparation, reactor process, separations process and power reactors. Since this series was well accepted by the professors, these seminars will be given again next summer.

REGISTRATION CLERK

To aid in handling registrations, the School has obtained a clerk to work two hours each evening to accept registrations and receive cash payments. This permits complete help in the daytime and allows more counseling time with students.

UNDERGRADUATE STUDY

An increasing number of employees have inquired about taking enough undergraduate courses in the School to obtain an engineering degree. The School offers just a few courses that will help these people. Due to this situation some employees are investigating work possibilities at other GE locations or with other companies where it is possible to work towards a BS degree by taking evening courses. It is felt that some study of this situation should be made in order to reduce the number of terminations for this cause.

EMPLOYEE & PUBLIC RELATIONS DEPARTMENT
HEALTH & SAFETY SECTION
AUGUST 1956

General

Personnel Changes

Nine additions and ten deletions resulted in a decrease in personnel to 218.

Visits

Mr. McKinnon attended a meeting on "Noise in Industry" at the University of Washington.

Industrial Medicine

Treatment was continued on one operations employee who accidentally inhaled some plutonium June 18, 1956.

Arrangements were completed for the Industrial Medical services to change headquarters on September 9th from Kadlec Hospital into the Medical Dental Building adjacent to the hospital.

X-ray, laboratory, electrocardiography, bacteriology, and some physiotherapy and pharmacy will be purchased from the hospital, after the change of the hospital to Methodist operation September 10th.

Safety and Fire Prevention

There was one disabling injury as a result of an automobile collision. There were 337 medical treatment cases for the plant and 12 for the community.

Kadlec Hospital

Short term agreements for space in the Public Health and Medical Dental Buildings and for services were made with the Kadlec Methodist Hospital until long term arrangements can be made. Inventory of supplies and equipment were completed in order that proper transfer of hospital items may be made to the Methodists while retaining industrial medical items for General Electric. The average daily hospital census increased from 50.2 to 50.7 as compared with 53.0 a year ago.

Public Health

The decline in communicable diseases continued with 25 cases being reported in August.

The state public health director of epidemiology visited the area in connection with the outbreak of equine encephalitis.

HEALTH & SAFETY SECTION

AUGUST 1956

Industrial Medical Services

Dispensary visits increased from 5861 to 6146. There was one disabling injury bringing the year to date number to nine.

Examinations increased from 856 to 1040, bringing the year to date total to 7259.

There were two information meetings held for industrial physicians.

Edathamil Calcium-Disodium therapy of one operating employee was continued during the month in an effort to increase elimination of plutonium.

Preparation for moving the industrial medical facilities was continued and negotiations for procurement of necessary services from Kadlec Methodist Hospital have been carried out.

Dispensary service in the 700 Area was discontinued September 1st. These services will be made available in the Medical Dental Building.

Dispensary services in Richland on the 4-12 and 12-8 shifts were also discontinued on September 10th. Patients will report to Kadlec Hospital during these hours and will be attended when necessary by the industrial physician on call.

The last meeting of the Health Activities Committee was held on August 16th. No health topic was prepared for the coming month.

Net costs for the month of July were \$37,284, a decrease of \$3,176 from the month of June. This was due entirely to lower costs incurred in operations. July costs compare favorably with budget limitations showing a net underrun of approximately \$2,000.

Costs-Operations

	July	June	Increase (Decrease)
Salaries	\$35,261	\$36,228	\$ (967)
Continuity of Service	3,174	3,260	(86)
Laundry	178	190	(12)
Utilities, Transportation, Maintenance	3,918	4,731	(813)
Supplies and Other	4,891	6,652	(1,761)
Total Gross Costs	47,422	51,061	(3,639)
Less: Revenue	818	954	136
Expense Credits	9,320	9,647	327
Net Cost of Operation	\$37,284	\$40,460	\$3,176

HEALTH & SAFETY SECTION

AUGUST 1956

<u>Industrial Medical Services (Continued)</u>	<u>July</u>	<u>August</u>	<u>Year to Date</u>
<u>Physical Examinations</u>			
<u>Operations</u>			
Pre-employment	90	75	583
Rehire	15	39	134
Annual	159	229	2433
Interim	51	95	448
A.E.C.	22	27	192
Re-examination and recheck	193	158	1304
Termination	86	185	778
Sub-total	616	808	5872
<u>Contractors</u>			
Annuals	0	0	6
Pre-employment	152	121	560
Recheck	88	111	337
Termination and Transfer	0	0	225
Interim	0	0	259
Sub-total	240	232	1387
Total Physical Examinations	856	1040	7259
<u>Laboratory Examinations-Clinical</u>			
<u>Operations</u>			
Government	112	106	820
Pre-employment, Termination, Transfer	1116	1560	8006
Annual	982	1299	13749
Recheck (Area)	285	562	2529
First Aid	74	67	338
Sub-total	2569	3594	25442
<u>Contractors</u>			
Pre-employment, Termination, Transfer	930	501	6047
Total Clinical Laboratory Examinations	3499	4095	31489
<u>X-Ray</u>			
<u>Operations</u>			
Government	5	20	69
Pre-employment, Termination, Transfer	143	130	886
Annual and Interim	255	393	3353
First Aid	38	45	361
Sub-total	441	588	4669
<u>Contractors</u>			
Pre-employment, Termination, Transfer	176	90	892
First Aid	15	10	54
Sub-total	191	100	946
Total X-Ray	632	688	5615
Electrocardiographs	90	100	1051
Physical Therapy Cases Referred	101	111	964

HEALTH & SAFETY SECTION

AUGUST 1956

<u>Industrial Medical Services (Continued)</u>	<u>July</u>	<u>August</u>	<u>Year to Date</u>
<u>First Aid Treatments</u>			
<u>Operations</u>			
New Occupational Cases	512	501	3671
Occupational Case Retreatments	1729	1679	12702
Non-occupational Treatments	3401	3614	28307
Sub-total	5642	5794	44680
<u>Construction</u>			
New Occupational Cases	68	90	266
Occupational Case Retreatments	137	227	680
Non-occupational Treatments	14	35	127
Sub-total	219	352	1073
Total First Aid Treatments	5861	6146	45753
<u>Disabling Injuries</u>			
General Electric	1	1	9
Contractors	0	0	0
Total	1	1	9
<u>Nurse Visits</u>			
Calls made	0	2	5
Employee Personal Illness	0	2	4
Absent due to illness in family	0	0	0
Not at home when call was made	0	0	1

HEALTH & SAFETY SECTION

AUGUST 1956

Kadlec Hospital

The average daily adult census increased from 50.2 to 50.7 as compared with 53.0 a year ago. This represents an occupancy percentage of 46.5 broken down as follows: Mixed Services (Medical, Surgical, Pediatrics) 53.6, Obstetrical Service 42.4. A further breakdown of the Mixed Services shows Medical 50.0, Surgical 62.2 and Pediatrics 19.5.

The maximum and minimum daily census ranged as follows:

	<u>Maximum</u>	<u>Minimum</u>
Mixed Services	54	31
Obstetrical Service	15	4
Total Adult	62	40

The average daily newborn census decreased from 8.7 to 8.6 as compared with 8.8 a year ago.

The ratio of hospital inpatient employees to patients (excluding newborn) for the month of July was 2.24:1. When newborn are included the ratio is 1.94.

The net expense for the operation of Kadlec Hospital for July was \$13,972 as compared with \$31,467 for June. Summary is as follows:

Kadlec Hospital net expense	\$13,972
This represents a decrease of \$17,495 from June resulting primarily from:	
1. Slightly higher census, longer month with increased revenue	\$5,897
2. Decreased salaries & supplies	5,371
3. Lower maintenance costs	3,000
4. Lower food costs	1,730
5. Decreased travel expense	717
6. Other miscellaneous reductions	780
	<u>\$17,495</u>

Work is continuing on the rewiring of the hospital and the installation of the motor generator for emergency power.

A complete inventory of hospital equipment, including industrial items, was taken on August 24 and 25 except for pharmacy items and "daily" food items. Library books were not inventoried. These were all scheduled for inventory in September prior to the transfer of the hospital to the Methodists.

Arrangements were completed for the termination of employees not remaining with the Health and Safety Section after September 9, 1956, approximately 125 people.

HEALTH & SAFETY SECTION

AUGUST 1956

Kadlec Hospital (Continued)

Negotiations were begun on the provision of hospital services such as laboratory, x-ray, pharmacy and physical therapy to the industrial medical program.

HEALTH & SAFETY SECTION

AUGUST 1956

Hospital Unit (Continued)	July	August	Year to Date
<u>Kadlec Hospital</u>			
Average Daily Adult Census	50.2	50.7	56.1
Medical	16.5	18.5	19.0
Surgical	20.4	19.9	20.8
Pediatrics	4.6	3.7	7.4
Mixed	41.5	42.1	47.2
Obstetrical	8.7	8.6	8.9
Average Daily Newborn Census	9.2	8.5	9.1
Maximum Daily Census:			
Mixed Services	56	54	72
Obstetrical	15	15	21
Total Adult Census	63	62	83
Minimum Daily Census:			
Mixed Services	28	31	21
Obstetrical Service	2	4	2
Total Adult Census	35	40	29
Admissions: Adult	343	344	2943
Discharges: Adult	312	359	2928
Medical	64	88	686
Surgical	133	164	1250
Pediatrics	52	42	469
Mixed	249	294	2405
Obstetrical	63	67	525
Newborn	59	61	488
Patient Days: Adult	1556	1572	13682
Medical	510	572	4628
Surgical	632	617	5078
Pediatrics	114	116	1806
Mixed	1286	1305	11512
Obstetrical	270	267	2170
Newborn	284	264	2221
Average Length of Stay: Adults	5.0	4.4	4.7
Medical	8.0	6.5	6.7
Surgical	4.8	3.8	4.1
Pediatrics	2.8	2.8	3.9
Mixed	5.2	4.4	4.8
Obstetrical	4.3	4.0	4.1
Newborn	4.8	4.3	4.6
Occupancy Percentage: Adults	46.1	46.5	51.5
Medical	44.6	50.0	51.4
Surgical	63.8	62.2	65.0
Pediatrics	24.2	19.5	38.9
Mixed	47.2	47.8	53.6
Obstetrical	41.4	41.0	42.4
Newborn	35.4	32.7	35.0
(Occupancy Percentage based on 109 adult beds and 26 bassinets.)			

HEALTH & SAFETY SECTION

AUGUST 1956

Hospital Unit (Continued)	July	August	Year to Date
Avg. Nursing Hours per Patient Day:			
Medical, Surgical, Pediatrics	3.81		
Obstetrics	4.32		
Newborn	3.92		
Avg. No. Employees per Patient (excluding newborn)			
Operations: Major	61	56	419
Minor	54	50	396
E.E.N.T.	35	53	442
Dental	1	1	11
Births: Live	64	59	492
Still	0	1	2
Deaths	3	6	31
Hospital Net Death Rate	.27%	.47%	.32%
Net Autopsy Rate	66.6	66.6	54.8
Discharged against advice	0	1	4
One Day Cases	67	99	694
Admission Sources:			
Richland	77.8	80.8	82.6
North Richland	0	0	.2
Other	22.2	19.2	17.2
Admissions by Employment:			
General Electric	76.4	78.8	78.8
Government	3.5	2.6	3.3
Facility	5.5	6.7	5.8
Contractors	4.1	.9	2.4
Schools	.9	2.3	1.6
Others	9.6	8.7	8.1
Hospital Outpatients:			
First Aid	503	485	3699
Clinical Laboratory	135	207	1326
Bacteriological Laboratory	43	35	420
X-Ray	177	180	1001
Physical Therapy	238	315	2169
Physical Therapy Treatments			
Outpatient Treatments	137	204	1738
Inpatient Treatments	87	57	850
Total	224	261	2588
Pharmacy			
No. of Prescriptions Filled	2602	2701	20967
No. of Store Orders Filled	535	490	4153

HEALTH & SAFETY SECTION

AUGUST 1956

Hospital Unit (Continued)	July	August	Year to Date
<u>Kadlec Hospital (Continued)</u>			
<u>Clinical Laboratory Examinations</u>			
Outpatient Examinations	340	489	3736
Hospital	2928	2900	24229
Total	3268	3389	27965
<u>X-Ray Examinations</u>			
Outpatient Examinations	192	292	1111
Hospital	155	147	1433
Public Health	0	7	91
Total	347	446	2635
<u>Electrocardiographs</u>			
Outpatient Examinations	0	1	3
Hospital	26	28	260
Total	26	29	263
<u>Bacteriological Laboratory</u>			
Treated Water Samples	260	209	1598
Milk Samples (Inc. Cream & Ice Cream)	40	46	322
Other Bacteriological Tests	331	293	3038
Total	631	548	4958
<u>Patient Meals</u>			
Regulars	2520	2666	20230
Children under 8	270	215	3845
Specials	772	727	7365
Softs	382	466	4203
Tonsil and Adenoid	54	88	732
Liquids	132	127	1124
Surgical Liquids	70	64	557
Total	4200	4353	38056
<u>Cafeteria Meals</u>			
Noon	1330	1765	11309
Night	251	237	1933
Total	1581	2002	13242

HEALTH & SAFETY SECTION

AUGUST 1956

Public Health Unit

Communicable disease reports fell off to a new low for the year, the 25 cases reported representing a 44% decrease from the total reported in July. Two of these cases were polio, both in adult women. Both cases were mild, non-paralytic.

Despite the reduced communicable disease load, there was a 14% increase in field nursing visits. Tuberculosis follow-up visits and visits regarding school health services accounted for this increase.

The Unit was visited by the following representatives of the State Department of Health. Duane Anderson, hearing consultant, had consultations with four youngsters regarding adjustment to hearing aids; Ted Roscoe, polio surveillance epidemiologist, visited the Health Officer to outline plans for followup of polio cases and suspects; Dr. W. R. Geidt, chief epidemiologist, visited the Unit to discuss the encephalitis outbreak and its significance to the area.

Twenty-five children were examined at a crippled children's clinic by Dr. C. Don Platner and a State Health Department team.

The health officer attended a post-clinic evaluation with Dr. Ellen McNellis, director of the crippled children's program, to discuss further management of clinic cases.

The health officer and health educator attended a meeting of school administration officials in order to inform them of plans for school health services. The principals expressed interest in the total public health program, and they were invited to an "open house" meeting at the Unit offices.

The age-census survey was completed. A significant change from 1950 was noted in the total population, which increased from 22,000 to 26,000. The median age in 1950 was 25.5--in 1956, 23.5. Children under 14 increased from 34.6% of the total to 37.0%. The group age 25 to 44 decreased to 32.4% of the total from 40.1%. The 45 to 54 age group increased from 8.3% to 12.1%. A report of the above was sent to the State Health Department and accepted by them as valid estimates.

During August, 1956, 21 new families or individuals were accepted for social service counseling, bringing the total active cases to 104 for the month. This activity is unusual for a summer month, when vacations and recreational pursuits customarily reduce the work load.

Of the 273 interviews, 39 focused on marital discord, 94 interviews with parents were concerned with the behavior of children, 57 appointments with children displaying predelinquent behavior, focused on a better understanding of the child, 24 interviews with adolescents concerned behavior and adjustment problems, 47 interviews with adults concerned personality adjustment, 4 interviews involved planning for substitute care of children, 1 interview concerned suspected mental illness, 4 appointments involved medical-economic problems and 2 situations concerned economic distress and 1 interview involved child custody.

Service was completed satisfactorily on 14 of the 17 cases closed. Two persons did not wish to continue and one situation was referred to another agency.

HEALTH & SAFETY SECTION

AUGUST 1956

Public Health Unit (Continued)

Due to a new location of a building in the old Hanford area, one of the old wells was put back on full time operation. However, the water was found unfit for human consumption after repeated tests, and recommendations for correction were made. Attempts will be made to purify the water by chlorination. If this doesn't work the well will be condemned.

One of the local restaurants in town closed permanently; two others were warned about the laxity in the cleanliness of their places and were notified to bring these places up so that all health requirements will be met.

Pollen nuisance should be lowered considerably in the coming year, if present plans follow through. The irrigation ditch flowing through the center of town will be drained and filled. The fence will be taken down and all weeds removed.

Plans are under way for all food handlers in the local schools to attend a two day session of food handlers' classes.

HEALTH & SAFETY SECTION

AUGUST 1956

Public Health (Continued)	July	August	Year to Date
<u>Education</u>			
Pamphlets distributed	10,989	18,599	94,493
News Releases	8	8	78
Staff Meetings	5	6	33
Classes	1	0	92
Attendance	4	0	1,585
Lectures & Talks	3	5	57
Attendance	107	184	2,832
Films Shown	1	1	92
Attendance	40	20	3,112
Community Conferences & Meetings	16	5	107
Radio Broadcasts	5	0	39
TV Broadcasts	5	0	36
<u>Immunizations</u>			
Diphtheria Completed	0	0	18
Diphtheria Booster	0	2	956
DPT Booster	1	0	355
Smallpox	3	2	1,918
DT Completed	42	1	160
DT Booster	0	0	4
Typhoid	1	2	3
Typhoid Booster	0	0	1
Tuberculin Test	18	23	246
Immune Globulin	0	0	558
Other	0	0	13
Tetanus	0	1	133
Tetanus Booster	0	0	1
<u>Social Service</u>			
Cases carried over	81	83	547
Cases admitted	13	21	178
Cases closed	13	17	132
Remaining case load	81	87	593
<u>Activities:</u>			
Out of office	2	1	33
Office Interviews	243	272	1,932
Conferences	35	29	392
Meetings	40	53	375
<u>Sanitation</u>			
Inspections made	43	101	605
Conferences held	11	48	239

HEALTH & SAFETY SECTION

AUGUST 1956

Public Health (Continued)	<u>July</u>	<u>August</u>	<u>Year to Date</u>
<u>Communicable Diseases</u>			
Chickenpox	14	3	231
Erysipelas	0	0	2
Food Poisoning	0	0	4
German Measles	8	12	100
Impetigo	1	0	5
Infectious Hepatitis	1	0	4
Measles	11	3	717
Mumps	3	2	90
Poliomyelitis	0	2	2
Pinkeye	1	1	7
Ringworm	2	0	5
Roseola	2	1	27
Scarlet Fever	2	1	52
Strep. Infection (Throat)	0	0	23
Thrush	0	0	2
Tuberculosis	0	0	2
Whooping Cough	0	0	80
Total	45	25	1,353
 Total No. Nursing Field Visits	 252	 287	 2,813
Total No. Nursing Office Visits	13	32	171

COMMUNITY SECTION

AUGUST 1956

ORGANIZATION AND PERSONNEL:

	<u>BEGINNING OF MONTH</u>		<u>END OF MONTH</u>	
	<u>EXEMPT</u>	<u>NONEXEMPT</u>	<u>EXEMPT</u>	<u>NONEXEMPT</u>
Community Administration	1	1	1	1
Clerk of the Council	0	1	1	1
Maintenance & Renovation Unit	6	67	6	90
Police Unit	13	27	13	28
Commercial & Residential Property Unit	5	22	5	21
Fire Unit (Includes 32 Firemen)	49	0	49	0
Electrical Unit	4	16	5	16
Transfer Study	1	1	1	1
Engineering Unit	3	3	3	3
Water & Sewerage Utilities Unit	6	27	6	27
Library Unit	4*	10**	4*	11**
Public Works & Recreation Unit	6	50	6	46
	98	225	100	245

	<u>Exempt</u>	<u>Nonexempt</u>
Additions to Payroll	2	25
Transfers In		8
Removals from Payroll		7
Transfers Out		6
Net increase	22	

*Includes one half-time employee.
 **Includes two half-time employees.

MAINTENANCE AND RENOVATION UNIT

August, 1956

	<u>Exempt</u>	<u>Nonexempt</u>
Employees - Beginning of month	6	67
Rehires	0	15
Transfers in	0	11
Transfers out	0	2
Terminations	0	1
Employees - End of month	6	90

NOTE:

The increase of personnel is due to rehires and transfers-in of painters for resumption of the exterior painting program. These employees were rehired on a temporary basis.

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EXTERIOR PAINT REPORT

August, 1956

FOREMAN: D. W. LUKINS

TYPE UNIT	NO. UNITS SCHEDULED	COMPLETED THIS MONTH	COMPLETED TO DATE	BALANCE TO BE PAINTED
A	21	0	0	21
B	47	3	3	44
D	3	0	0	3
E	28	11	11	17
F	50	1	1	49
G	5	0	0	5
H	42	3	3	39
Tract	1	0	0	1
TOTAL	197	18	18	179

Est. MH B. F.	0
Est. MH This month	<u>886</u>
Total Est. MH	886

Actual MH B. F.	0
Actual MH This month	<u>880$\frac{1}{2}$</u>
Total Actual MH	880 $\frac{1}{2}$

PLUMBING SHOP

August, 1956

FOREMAN: F. L. ELSENSOHN

Electric water heaters replaced	9
Laundry trays replaced	9
Miscellaneous plumbing work orders completed	52
Miscellaneous steam work orders completed	9
Plumbing for floor and sink linoleum	41
Cleared major sewer stoppages caused by tree roots	40
Cleared major sewer stoppages in main sewers	6
Radiators repaired in Dormitory W-2	17
Street steps replaced	11
Blacktop walks repaired	2
Broke up foundations and filled basements where houses were removed	6
Plumbing and steam repairs in hospital & public health buildings	31.0 hrs.
Plumbing & steam work in Medical-Dental Bldg. remodelling	150.0 hrs.
Worked on plumbing service orders	27.2 hrs.
Hauled salvage material to North Richland	22.0 hrs.

Made routine steam inspection once each week in Government owned commercial facilities, dormitories, and apartments.

Excavated with backhoe machine, for this Operation and for Public Works, for the cleaning out of roots in sewer lines and to repair all leaking and broken underground piping; backfilled, and landscaped excavated portions.

SERVICE ORDER CREW

FOREMAN: G. O. DENNEY

A. Service orders on hand at beginning of month	797
B. Received during month	1643
C. Completed during month	1800
D. On hand at end of month	640

E. A total of $104\frac{1}{2}$ manhours were expended on work orders.

F. Backlog of service orders by craft:

Plumbing	3	
Electrical	389	(This includes 367 fire inspection orders)
Carpentry	<u>248</u>	
Total	640	

MECHANICAL SHOP AND RENOVATION AND LABOR CREW

August, 1956

FOREMAN: Z. H. MAYBERRY

A. Millwright Crew:

Routine furnace inspections	245
Furnace service orders	48

Six new line valves were installed on compressors and lines revamped on air conditioner in surgical ward of Kadlec Hospital.

All exhaust filter screens over kitchen ranges at Kadlec Hospital were cleaned.

B. Sheetmetal Crew:

Rain gutters replaced	4
Coal hatch flashings replaced	9
Shower stalls replaced	1
Fabricated tool boxes for trucks	2
Replaced tracks for ranch house closets	20
Fabricated ventilator for well house	1

C. Service Crew:

Tree removal orders completed	34
Stump removals completed for Electrical Distribution	132
Picked up tree limbs	11
Trash pick ups	5
Delivered topsoil	4

D. Renovation Crew:

Houses renovated	16
Minor carpentry repair orders	13
Houses sprayed for insects	3
Houses sprayed for odors	4

Provided weekly service of delivering linens and janitorial supplies to occupied dormitories.

Provided weekly pickup and delivery of laundry from various General Electric Company units to Richland Laundry and Dry Cleaners.

LINOLEUM AND CARPENTER SHOP

August, 1956

FOREMAN: R. M. MARTIN

Replaced bath wall tile	2
Repaired bath wall tile	3
Replaced bath floor linoleum	3
Repaired bath floor linoleum	1
Replaced kitchen floor linoleum	4
Repaired kitchen floor linoleum	8
Repaired bedroom floor linoleum	2
Repaired living room floor linoleum	6
Repaired dining room floor linoleum	2
Replaced linoleum on steps & landings	4
Replaced sink top linoleum	39
Repaired sink top linoleum	1
Replaced work bench linoleum	3
Repaired work bench linoleum	1
Repaired roofs	6
Repaired siding & shakes for exterior painting	261
Repaired walls	7
Replaced ranch house window screens	32
Replaced floor boards	7
Repaired screen doors	3
Repaired interior doors	1
Repaired porches for exterior painting	54
Repaired street steps	1
Repaired floor tile - C. C. Anderson's	1
Repaired floor tile - Medical-Dental Bldg.	1
Installed new tub moldings	6
Installed sill caps	4
Jack & shim	1
Chempoints	50
Paint touch ups	33

Two men are replacing sidewalk on the 1300 block of Wright Ave.

COMMUNITY SECTION
RICHLAND POLICE DEPARTMENT
MONTHLY REPORT
AUGUST, 1956

ORGANIZATION

	EXEMPT	NON-EXEMPT
EMPLOYEES - BEGINNING OF MONTH	13	27
TRANSFERS IN	0	0
TRANSFERS OUT	0	1
NEW HIRES	0	2
TERMINATIONS	<u>0</u>	<u>0</u>
TOTAL - END OF MONTH	13	28

GENERAL

DURING THE MONTH, TWO NEW PATROLMEN WERE RECEIVED AT THIS DEPARTMENT, AND ONE PATROLMAN TRANSFERRED TO THE SECURITY PATROL.

ONE NEW FORD SEDAN WAS RECEIVED THIS MONTH TO REPLACE A CHEVROLET SEDAN FORMERLY ASSIGNED TO THE RICHLAND POLICE UNIT. THE CHEVROLET HAS BEEN RETURNED TO THE TRANSPORTATION UNIT.

DETECTIVE G. A. MUMPER SERVED AS A MEMBER OF A PANEL GROUP WHICH DISCUSSED YOUTH ACTIVITIES IN THE TRI-CITY AREA AT THE WEST SIDE UNITED PROTESTANT CHURCH ON AUGUST 19.

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TRAFFIC

RICHLAND	1956		1955		1956	1955
	JULY	AUG.	JULY	AUG.	TOTAL TO DATE	TOTAL SAME PERIOD
REPORTABLE ACCIDENTS	11	19	10	17	182	146
PROPERTY DAMAGE ACCIDENTS	8	13	6	15	155	126
INJURY ACCIDENTS	3	6	4	2	26	20
TOTAL PERSONS INJURED	4	6	5	2	32	24
FATAL ACCIDENTS	0	0	0	0	1	0
ACCIDENTS-DAYLIGHT HOURS	9	13	7	15	140	109
DARKNESS HOURS	2	6	3	2	42	37
ACCIDENTS-BUSINESS DISTRICT	4	10	4	8	60	44
RESIDENTIAL "	6	9	5	6	109	74
OTHER "	1	0	1	3	13	28
ACCIDENTS INVESTIGATED	7	16	8	12	120	99
CRIMINAL COMPLAINTS FILED	4	7	4	9	69	54
VIOLATIONS CONTRIBUTING TO ACCIDENTS:						
NEGLIGENT DRIVING	0	2	4	3	26	20
FAIL. TO YIELD RIGHT OF WAY	2	7	4	5	59	44
FOLLOWING TOO CLOSELY	4	2	0	2	24	19
DRUNK DRIVING	0	1	0	1	3	3
PEDESTRIAN VIOLATION	1	0	1	1	3	5
INATTENTION TO DRIVING	0	0	0	2	1	4
RECKLESS DRIVING	0	0	0	0	0	1
SPEEDING	0	0	0	0	2	1
UNSAFE SPEED	1	0	0	0	40	18
IMPROPER BACKING	0	0	0	0	2	7
IMPROPER PARKING	0	0	0	0	0	0
DISREGARDING STOP SIGN	0	1	0	0	1	4
HIT AND RUN	0	0	0	0	0	2
IMPROPER PASSING	2	0	1	1	5	5
IMPROPER TURN	0	0	0	0	6	3
WIDE RIGHT TURN	0	0	0	1	0	1
FAILURE TO SIGNAL	0	1	0	0	1	1
DEFECTIVE EQUIPMENT	1	1	0	0	3	2
WRONG SIDE OF ROAD	0	1	0	0	1	1
ANIMAL IN ROAD	0	0	0	0	0	2
BICYCLE VIOLATION	0	1	0	1	2	4
PASSENGER FELL FRM MOTORCYCLE	0	1	0	0	1	0
BLINDED BY ONCOMING HEADLIGHTS	0	1	0	0	1	0

RICHLAND	1956		AVE. PER ACCIDENT 1956		AVE. PER ACCIDENT 1955	
	JULY	AUGUST	JULY	AUG.	JULY	AUG.
ACCIDENT PROPERTY DAMAGE	\$2,871.00	\$5,375.00	\$231.00	\$282.90	\$277.50	\$130.63

TRAINING

ADVANCE TRAINING FOR RICHLAND POLICE MEMBERS AT THE SMALL ARMS RANGE FOR THE PERIOD IN FIELD INSTRUCTION WAS AS FOLLOWS:

.38 CALIBER REVOLVER	1/2 HOUR
TOTAL NUMBER OF MEN REPORTING AT THE RANGE	12
NUMBER OF MEN FIRED OVER THE ARMY-L COURSE	12

QUALIFICATIONS ON THE ARMY-L COURSE AS FOLLOWS:

EXPERT	2	17%	MARKSMAN	5	42%
SHARPSHOOTER	4	33%	UNQUALIFIED	1	8%

ACTIVITIES	JUNE	JULY	AUGUST
BANK ESCORTS AND DETAILS	0	0	3
BIKES IMPOUNDED	2	12	3
BIKE VIOLATIONS, OTHER	0	0	1
BIKES REGISTERED	14	27	24
CHILDREN LOST AND FOUND	17	12	22
COMPLAINTS INVESTIGATED	136	117	153
DEATHS REPORTED	0	0	3
DOG, CAT, OTHER ANIMAL, COMPLAINTS	16	20	11
DOGS, OTHER ANIMALS, RPTD LOST/FOUND	18	22	15
DOORS, WINDOWS, RPTD OPEN IN FACILITIES	87	39	46
EMERGENCY MESSAGES DELIVERED	12	7	9
FIRES INVESTIGATED	14	4	15
GUNS REGISTERED	4	3	4
LAW ENFORCEMENT AGENCIES ASSISTED	12	9	5
LETTERS OF INQUIRY	109	117	133
MISCELLANEOUS DETAILS AND ESCORTS	7	6	6
PERSONS INJURED BY DOGS	4	4	1
PLANT DEPARTMENTS ASSISTED	20	14	28
PRIVATE INDIVIDUALS ASSISTED	54	57	71
PRISONERS PROCESSED THROUGH JAIL	6	8	16
PROPERTY LOST AND FOUND	16	25	29
RECORDS INQUIRIES	24	23	31
REPORTS PROCESSED THROUGH RECORDS	151	151	228
STREET LIGHTS OUT REPORTED TO ELECTRICAL	122	89	101
TRAFFIC SAFETY MEETINGS (AUG. ATT. 107)	16	9	4
TOTALS	861	777	961

MONTHLY REPORT
 RICHLAND POLICE DEPARTMENT
 AUGUST 1956

OFFENSES	KNOWN	UNFOUNDED	CLEARED OTHER	CLEARED ARREST
PART I				
1. CRIMINAL HOMICIDE	-	-	-	-
A. MURDER & NON. NEG. MANS.	-	-	-	-
B. MANS. BY NEGLIGENCE	-	-	-	-
2. RAPE	-	-	-	-
3. ROBBERY	-	-	-	-
4. AGGRAVATED ASSAULT	-	-	-	-
5. BURGL-BREAK. & ENTRY	3	1	1	-
6. LARCENY OVER \$50.00	6	1	2	1
UNDER \$50.00	32	-	4	13
7. AUTO THEFT	1	1	-	-
TOTAL PART I CASES	42	3	7	14
PART II				
8. OTHER ASSAULTS	1	-	-	1
9. FORGERY & COUNTERFEIT	2	-	-	5*
10. EMBEZZLEMENT & FRAUD	-	-	-	-
11. STOLEN PROP:BUY:RECEIVE	-	-	-	-
12. WEAPONS:CARRY:POSSESSING	-	-	-	-
13. PROSTITUTION	-	-	-	-
14. SEX OFFENSES	3	-	1	1
15. OFFENSES AG. FAM. & CHILD	-	-	-	-
16. NARCOTICS	-	-	-	-
17. LIQUOR LAWS	-	-	-	-
18. DRUNKENNESS	9	-	1	8
19. DISORDERLY CONDUCT	-	-	-	-
20. VAGRANCY	-	-	-	-
21. GAMBLING	-	-	-	-
22. DRUNK DRIVING	3	-	-	3
23. VIOL. ROAD & DRIVING LAWS:				
FAILURE TO STOP & IDENTIFY	2	-	-	2
SPEEDING	25	-	11	14
STOP SIGN	9	-	1	8
NEGLIGENT DRIVING	19	-	2	17
RIGHT OF WAY	9	-	-	9
RECKLESS DRIVING	3	-	-	3

<u>OFFENSES</u>		<u>KNOWN</u>	<u>UNFOUNDED</u>	<u>CLEARED OTHER</u>	<u>CLEARED ARREST</u>
24.	DEFECTIVE EQUIPMENT	13	-	8	5
	ILLEGAL PASSING	2	-	-	2
	PARKING	17	-	8	9
25.	ALL OTHER TRAFFIC VIOLATIONS	11	-	4	7
26.	ALL OTHER OFFENSES:				
	VANDALISM	4	-	-	-
	PUBLIC NUISANCE	10	-	1	9
	MISCHIEF	4	-	3	-
	BIKE VIOLATIONS	3	-	3	-
	ACCIDENTAL DROWNING	1	-	1	-
	ALLOWING VICIOUS ANIMAL TO RUN	1	-	-	1
	AUTO PROWL	3	-	-	1
	ACCIDENTAL DEATH	1	-	1	-
	FIRE	1	-	-	-
27.	SUSPICION	-	-	-	-
TOTAL PART II CASES		156	-	45	105
PART III					
28.	MISSING PERSONS	10	-	10	-
	LOST PERSONS	4	-	4	-
	LOST ANIMALS	3	-	2	-
	LOST PROPERTY	4	-	2	-
29.	FOUND PERSONS	2	-	2	-
	FOUND PROPERTY	3	-	2	-
	FOUND ANIMALS	6	-	6	-
TOTAL PART III CASES		32	-	28	-

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<u>OFFENSES</u>		<u>KNOWN</u>	<u>UNFOUNDED</u>	<u>CLEARED OTHER</u>	<u>CLEARED ARREST</u>
PART IV					
30.	FAT. M.V. TRAFF. ACCID.	-	-	-	-
31.	PERS. INJ. M.V. TRAFF. ACCID.	6	-	-	-
32.	PROP. DAM. M.V. ACCID.	13	-	-	-
33.	OTHER TRAFFIC ACCIDENTS	-	-	-	-
34.	PUBLIC ACCIDENTS	No Accurate Statistics Kept			
35.	HOME ACCIDENTS				
36.	OCCUPATIONAL ACCIDENTS				
37.	FIREARMS ACCIDENTS	-	-	-	-
38.	DOG BITES	1	-	-	-
39.	SUICIDES	-	-	-	-
40.	SUICIDE ATTEMPTS	-	-	-	-
41.	SUD. DEATH & BOD. FOUND	-	-	-	-
42.	SICK CARED FOR	-	-	-	-
43.	MENTAL CASES	1	-	-	-
TOTAL PART IV CASES		20	-	1	-

COMPOSITE TOTALS

PART I, II, III, IV CASES

250

3

81

119

CASES LISTED UNDER "CLEARED OTHER" ARE THOSE CLEARED BY VARIOUS MEANS OTHER THAN ARREST, SUCH AS: ORDER FROM THE PROSECUTOR, JUVENILE PROBATION OFFICER OR OTHER SITUATIONS IN WHICH A MUTUAL AGREEMENT IS OBTAINED. THEY ARE DEFINITELY CLEARED CASES AND DIFFER FROM THE ARREST COLUMN ONLY IN THAT THERE WAS NO ARREST. *4 CASES CLEARED ARREST FOR PREVIOUS MONTHS.

PROPERTY REPORTED STOLEN	RICHLAND	\$2,796.00
PROPERTY RECOVERED	RICHLAND	2,259.50

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MONTHLY REPORT		RICHLAND POLICE DEPARTMENT			JUVENILES INVOLVED			AUGUST 1956		
OFFENSES	NO. CASES	JUVENILES	SEX		9	11	13	14	16	17
DISTURBANCE	2	6	3M 3F					1	1	4
MISCHIEF	2	9	M		1	3	1			4
INTOXICATED JUVENILES	1	2	M						1	1
TOTALS	5	17			1	3	1	1	2	9

CASES

I DRUNK DRIVING - COMMITTED TO CNTY JAIL IN LIEU OF FINE,
 5 DAYS SUSP, DRVRS LIC SUSP 60 DAYS.
 I DRUNK DRIVING - CNTY JAIL 5 DAYS SUSP, DRVRS LIC SUSP 90 DAYS.
 I RECKLESS DRVG - SUSP DRVRS LIC 60 DAYS DEFERRED UNTIL 8-31-56.
 I RECKLESS DRVG - AMENDED TO NEGLIGENT DRIVING.
 I GRAND LARCENY - AMENDED TO PETIT LARCENY,
 30 DAYS CNTY JAIL.
 I PUBLIC NUISANCE - SENT TO NOT MORE THAN
 10 DAYS.
 I PERM VICIOUS ANIMAL TO RUN AT LARGE - FINE
 SUSP PROVIDING DOG KEPT FROM RICHLAND.

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COMMERCIAL AND RESIDENTIAL PROPERTY UNIT
COMMUNITY SECTION
August, 1956

PERSONNEL - COMMERCIAL AND RESIDENTIAL PROPERTY UNIT:

	<u>Exempt</u>	<u>Non-Exempt</u>
Employees - beginning of month	5	22
Transfers In	0	1
Transfers Out	0	3
New Hires	0	1
Terminations	<u>0</u>	<u>0</u>
Employees - end of month	5	21

PERSONNEL - COMMERCIAL AND NONCOMMERCIAL FACILITIES

	<u>Commercial</u>	<u>Noncommercial</u>	<u>Total</u>
July	1595	78	1673
August	1585	78	1663
Net Change	-10	0	-10

SUMMARY OF ROUTINE ITEMS PROCESSED:

	<u>Commercial</u>	<u>Noncommercial</u>	<u>Total</u>
Work Orders	42	2	46
Back Charges	0	0	0
FY Work Orders	86	4	90
FY Back Charges	0	0	0

CONTRACTS AND NEGOTIATIONS:

A. Commercial

Supplemental Agreements

1. Davis Furniture Co. - to provide for remodeling, and construction of a building addition.
2. L. G. Cook - to provide for additional use of premises.
3. Parker Hanson - to provide for additional use of premises.

B. Noncommercial

Lease

Richland Riders Club - an 8 acre tract which had been used under a permit.

GENERAL

. Commercial

1. Lukins & Mc Dermott opened a paint store in the Parker Hanson building in Westgate Shopping Center.
2. Lloyd Thompson purchased the Western Auto Supply business from Orris Otheim in McVickers Building No. 4.
3. Udell Wagner terminated his sublease for the operation of the Texaco Service station at Swift and Goethals.
4. Burks Brothers subleased the Texaco Service Station at Swift and Goethals.
5. Paul Fredette, operating Paul's Tuneup at the Texaco Station, remained with the new sublessee.
6. Tim's Drive In, located at 471 Williams Boulevard, closed.
7. Sandy's Cafe, located in the Parker Hanson building in the Westgate Shopping Center, closed.
8. Campbell's Market General Office sublease expired in the W. D. Gray building.
9. Gail's Apparel sublease expired in the Bailey Building No. 1.
10. G. C. Butler renewed his sublease in the Richland Development Co. building.
11. Gilson's Fabrics renewed their sublease in the Uptown Investment Co. building.
12. Thompson and Davis Service Center renewed their sublease in the Automatic Laundry Co. building.

B. Noncommercial

1. Three private boat moorage permits were issued.

COMMERCIAL PROSPECTS

Inquiries were received during the month concerning the establishment of the following types of enterprises in Richland.

Root Beer Drive In - Mortuary - Tavern

SUMMARY OF OCCUPANCY AND EXPANSION STATUS:

Commercial		
	<u>July</u>	<u>August</u>
1. Number of Government-Owned Buildings	40	40
a. Number of Businesses operated by Prime Lessees	*36	36

	<u>July</u>	<u>August</u>
(1) Number opened	0	0
(2) Number closed	0	0
b. Number of Businesses operated by Sublessees	23	22
(1) Number opened	0	0
(2) Number closed	1	1
Total Businesses in Government-Owned Buildings	*59	58
2. Doctors and Dentists in Private Practice	31	31
3. Number of Privately-Owned Buildings	85	85
a. Number of Businesses operated by Prime Lessees	*59	59
(1) Number opened	1	0
(2) Number closed	0	0
b. Number of Businesses operated by Sublessees	125	123
(1) Number opened	1	4
(2) Number closed	0	6
Total Businesses in Privately-Owned Buildings	*184	182
4. Privately-Owned Buildings under Construction	3	3
5. Total Number of Businesses in Operation	*243	240
a. Total openings	2	4
b. Total closings	1	7
	*Revised figures	
B. Noncommercial		
1. Government-Owned Buildings		
a. Clubs and Organizations	5	5
b. Government Agencies	2	2
Total	7	7
2. Privately-Owned Buildings		
a. Completed and in Use	13	13
b. Under Construction	2	2
3. Church Plots and Buildings in Private Ownership	16	16
4. Pasture Land Permits	93	93
5. Private Boat Moorage Permits	69	72

COMMERCIAL AND RESIDENTIAL PROPERTY UNIT
TENANT RELATIONS

PROGRESS REPORT

	Orders Incomplete July 31, 1956	Orders Issued 8-1 to 8-29	Total Orders Incomplete August 29, 1956
Service Orders	989	1693	920
Work Orders	167	223	194
Service Charges		242	

<u>PRINCIPAL WORK ORDER LOAD</u>	<u>Incomplete July 31, 1956</u>	<u>Incomplete August 29, 1956</u>
Laundry Trays	25	30
Kitchen Cabinet Linoleum	38	16
Kitchen Floor Linoleum	7	5
Jack And Shim		37
Shower Stalls	3	7
Roof Repair, General		164
Trees, General		143
Blacktop Walks & Steps		54

ALTERATION PERMITS ISSUED - MONTH OF AUGUST 101
July 81

Partition Removals	1	Dishwasher	1
Concrete Sidewalk	1	Remove Laundry Trays	1
Dryers	20	Oil Furnace Conversions	11
Air Conditioners	8	Dryers & Washers	11
Washers	11	Fences	17
TV Antennas	11	Back Doors	7
Soft Water - Lindsay	1	Soft Water - Culligan	2
40 Amp. Service Box	1	Patios	6
Playhouse	1	Change Water Heater	1
Outlet - Kitchen	1	Basement Excavation	1
Clothes Poles	1	Outside Hosebib	1
Driveway	1	Planter - Window	1
Tool Sheds	2	Sand - Refinish Floors	2
Plug - Air Conditioner	1	Outlet - Air Conditioner	1

INSPECTIONS FOR MONTH OF AUGUST 619
July 567

Sink Top Linoleum	30	Floor Linoleum	18
Alteration Permits	15	Served Quit & Vacates	40
Top Soil	4	Walls	8
Tile	1	Roof	1
Porch	2	Floors	5

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INSPECTIONS FOR MONTH OF AUGUST - Continued

Ceilings	10	Walks	3
Steps	5	Trees	4
Jack & Shim	3	Shower Stalls	3
Cancellations	134	Shows	127
Renovations	131	Dormitories	75

TENANT STORES

<u>MERCHANDISE ISSUED</u>	<u>TOTAL AMOUNT</u>
Shades	328
TA Drip Trays	17
Ice Cube Trays	56
Refer Shelf Post	5
Hydrator Glass TA	8
Reflectors	34
Oven Rack	2
TA Meat Tender	10
Medicine Cab Shelf	3
Hydrator Glass GE	3
Cooker Pot	6
Cooker Pot Lid	6
Furnace Shaker	2
Door Stops	38
Grass Seed	4#
SC Drip Pans	8
Broiler Pan	1
Shade Brkt's.	14
Furniture Delivery	15
Furniture Recall	8

RECALL AND DELIVERY
OF
RANGES, REFRIGERATORS, AND SPACE HEATERS
MONTH OF AUGUST

	<u>Delivery</u>		<u>Recalled</u>		<u>Heater</u>	<u>Heater</u>
	<u>Ranges</u>	<u>Refers</u>	<u>Ranges</u>	<u>Refers</u>	<u>Delivery</u>	<u>Recall</u>
A	5 SC	2 TA	4 SC	5 TA		
B	4 SC	3 TA		3 TA		
E	1 HEW	1 TA		1 TA		
F	1 SC	2 TA		1 TA		
L		1 TA		1 TA		
Q		1 HEW		1 HEW		
U			2 HEW	1 HEW		
V		1 TA	1 HEW	1 TA		
		1 HEW				
Y	1 HEW	2 HEW	2 HEW	2 HEW		
1 BR				1 TA		
2 BR	3 SC	2 TA	3 SC	5 TA	4	4
3 BR	3 SC	1 TA	3 SC	5 TA	12	12
TOTAL	18	15	18	27	16	16

RECALL AND DELIVERY OF RANGES, REFRIGERATORS, AND SPACE HEATERS - Continued

43 Refers out on P.D.R. #RU 56 - II August 14, 1956.
1 GE Refer out on P.D.R. #RU 56 - II August 14, 1956.

RANGES IN WAREHOUSE

SC Ranges	19
GE Leader	7
3 Burner Apt.	1
4 Burner Apt.	1
Total Ranges in Whse.	<u>28</u>

REFERS IN WAREHOUSE

TA Refers 7'	6
GE Refers 8'	4
GE Refers 7'	2
GM Refers 7'	2
Total Refers in Whse.	<u>14</u>

COMMERCIAL & RESIDENTIAL PROPERTY UNIT
RESIDENTIAL LEASES

AUGUST 1956

DORMITORY REPORT

	<u>Beds Available</u>	<u>Vacant Beds</u>	<u>Occupied Beds</u>
Men	399	85	314
Women	305*	111**	194*
Total	704*	196**	508*

*This includes 2 beds used for Dormitory Offices.

**This includes 32 beds vacant in Dormitory M 13.

Waiting Lists:

	Single Rooms	Double Rooms
Men	0	0
Women	0	0

The following Dormitories are in stand-by condition:

W 11 - 38 Beds W - 12 - 38 Beds M 6 - 39 Beds
M 7 - 39 Beds M 8 - 39 Beds

Total Beds 193

Dormitories released for temporary office use:

W 15 - 50 Beds W 16 - 50 Beds W 21 - 50 Beds
W 17 - 50 Beds

Total Beds 200

RESIDENTIAL LEASING

<u>CANCELLATIONS</u>		<u>ALLOCATIONS</u>	
Voluntary Terminations	33	New Tenant	85
Transfers	9	Moves (Within Richland)	37
Moves off Project	41	Turnovers	3
Divorce	2	School Quota	6
Marriage	2	Total	131
Deceased	1	Houses on Which leases	
Move to Wherry House	1	were cancelled "Ready	
Moves	40	to Rent"	105
Excessed	2		
Not Eligible	2	Houses on which leases	
Retirement	1	were cancelled sent to	
Total	<u>151</u>	"Renovation"	21

Number persons on Master
List

Number names on Move List

376

6258

RICHLAND HOUSING

HOUSING UTILIZATION AS OF MONTH ENDING AUGUST 31, 1956
HOUSES OCCUPIED BY FAMILY GROUPS

	Conven.	A&J	T	Pre Cut	Ranch	Pre Fab	Dorm Apt.	A&J Apt.	2BR Apt.	4th Hsg.	Tract	Total
G. E.	2193	266	10	403	889	1116	7	56	59	202	22	5223
Comm. Fac.	97	18		21	44	59		5	3	9	2	258
AEC	64	25		13	33	21	3	2	5	9	2	177
Other Gov't.	10	4		1	3	3				1		22
Post Office	10				2	8					1	21
Schools	72			5	12	39			2	1		131
Comm. Act.	10			1	6	3				1		21
Med. Fac.	3	15		1	1	1				4		25
J. A. Jones	4	3			3	2						12
Not Cert.	1			1	1							3
Non Quota	22	2		1	3	12					1	41
Total	2486	333	10	447	997	1264	10	63	69	227	28	5934
Ready to Rent	10			1	1	6		1		3	1	23
In Renovation	4			2	2	6			1			15
Boarded Up												
Total	2500	333	10	450	1000	1276	10	64	70	230	29	5972

	Begin Month	Moved In	Moved Out	End of Month	Difference
Conventional	2493	47	-54	2486	-7
A&J	333	1	-1	333	0
"T"	10	1	-1	10	0
Precut	448	11	-12	447	-1
Ranch	999	10	-12	997	-2
Prefab	1260	51	-47	1264	4
Dorm Apts.	10	0	-0	10	0
A&J Apts.	62	6	-5	63	1
2BR Apts.	69	1	-1	69	0
4th Hsg.	227	9	-9	227	0
Tract	29	0	-1	28	-1
Total	5940	137	-143	5934	-6

COMMUNITY OPERATION SECTION
Richland Fire Department
Monthly Report
August 1956

<u>Organization and Personnel</u>	<u>Exempt</u>	<u>Non-Exempt</u>
Employees Beginning of Month	17	32
Transfers In	0	0
Transfers Out	0	0
Terminations	0	0
New Hires	0	0
End of Month	17	32

Fire Protection

Fire Loss (estimated):	Government	\$	295.00
	Personal		<u>1,428.37</u>
	August Total	\$	<u>1,723.37</u>
	1956 Total	\$	86,660.82

Response to Fire Alarms	29
Ambulance Responses	28
Inside Schools or Drills	12
Outside Drills	12
Safety Meetings	5
Security Meetings	2
Alarm Boxes Tested	216

Assistant Fire Chiefs attended August 12th and 19th schools at Larsen Air Force Base conducted by the Air Force and Boeing Aircraft Company in crash rescue procedures.

Fire apparatus was dispatched four times during the month to the A.E.C. airport to stand by during the landing and/or take-off of military aircraft.

The tank truck responded August 15th to West Richland on call for assistance by the West Richland Fire Chief when fire involved lumber storage. Nearby residences escaped damage.

Engine companies made pre-fire surveys of all public and parochial schools during August.

Engine 4 was detailed August 28th to assist Public Works attempt to open clogged underground pipeline at Sewage Treatment Plant.

The tank truck was dispatched August 25th and 27th to extinguish burning debris at the temporary disposal grounds.

A total of 476 residences were inspected during August with 289 reportable hazards detected. There were 276 "no answers" reported. For the year 1956, this totals 3,618 homes inspected, 2,299 "no answers" and 3,029 hazards reported. Twelve commercial buildings were also inspected by engine companies during August.

Fire Prevention

A total of 132 buildings were inspected resulting in 23 hazard reports. All Richland schools received a thorough inspection and found to be in excellent condition.

A total of 526 extinguishers were inspected, one installed and one removed for servicing. A hundred and thirty-three fire hose standpipes were inspected, 19 auxiliary fire alarm systems tested and 43 sprinkler systems inspected.

Assistant Fire Marshal addressed the Richland Lions Club on fire prevention.

Plans for the annual Fire Prevention Week campaign, October 6-13, were made at a meeting of the Richland Chamber of Commerce general committee on fire prevention.

Construction plans for the new educational building at the Northwest United Protestant Church were reviewed.

Fire Marshall attended a Civil Defense meeting with General Electric Company and Atomic Energy Commission management.

COMMUNITY SECTION
RICHLAND ELECTRICAL UNIT
MONTHLY REPORT
AUGUST 1956

<u>ORGANIZATION AND PERSONNEL</u>	<u>Exempt</u>	<u>Non-Exempt</u>
Employees Beginning of Month	4	16
New Hires	1	1
Transfers In		
Transfers Out		
Leave of Absence		1
Total End of Month	5	16
 <u>SYSTEM MAINTENANCE AND OPERATION</u>		
Outside Lines:		
Poles set		16
Poles transferred		16
Anchors and guys installed		9
Street lights installed		0
Mast arms installed		0
Street lights relamped - 1100 Area		162
Flood lights relamped - 1100 Area		13
Flood lights relamped - 700 Area		4
Traffic signals relamped		0
Primary line footage added		0
Primary line footage removed		0
Transformer KVA added		575
Transformer KVA removed		500
New services installed		3
Services removed		5
Scheduled outages		6
Unscheduled outages		6
Trees trimmed		53
Stand by and escort		3
 <u>TRAFFIC SIGNALS</u>		
Operational failures		1
Routine check R. R. Signal at Van Giesen		4
Total signals in operation - automatic		19
Total signals in operation - manual auxiliary		6
Total signals in operation - flasher		3

UTILITIES - ELECTRICAL MAINTENANCE

Electrical motors checked and serviced - irrigation	28
Electrical motors checked and serviced - water	99
Electrical motors checked and serviced - sewage	72

FIRE DEPARTMENT TEST AND MAINTENANCE

Inside circuit and equipment checks	3
Outside circuits checked	5
Inside faults repaired	1
New circuits placed in operation	0
Outside faults repaired	4
New boxes placed in operation	0

SUBSTATIONS

Main feeder breaker checks - BB1S1	4
Main feeder breaker checks - BB1S2	4
Secondary and pad located stations - checked jumpers, cutouts, grounds and general condition.	26

METERING - OPERATION, MAINTENANCE, CONSUMPTION AND REVENUE

Voltage and load checks	0
Meters tested - customer's requests	5
New meters shop tested	0
Faulty meters replaced or repaired	1
Damaged meters and covers	1
Residential read-ins	229
Residential read-outs	208
Residential disconnects	8
Residential reconnects	8
Radio interference checks	0
Overloaded meters changed out	3
Routine meter tests	79

Consumption and Revenue for Month of July 1956.

	<u>No. of Meters</u>	<u>KWH</u>	<u>Revenue</u>
Residential - Schedule 1	6,961	4,221,219	\$45,895.69
Commercial - Schedule 2	<u>420</u>	<u>3,987,715</u>	<u>24,583.94</u>
Total	7,381	8,208,934	\$70,479.63

CUSTOMER SERVICES

Performed routine maintenance on traffic signals, fire alarm system, sewage treatment system, and water system as required. Installed motor for No. 1 sludge pump and removed 3 motors for maintenance on the No. 1 digester. Installed a fan at 3000 "K" Well so as to get better cooling of the motor controller. Started routine patrol and trimming of trees from all fire alarm circuits. Installed controllers and wiring for new 75 hp electric motor at the 1182 Pump House. Installed new outlet in 722 Carpenter Shop and repaired electric eraser for the Library. Repaired meter loop damaged by contractor knocking tree onto house service. Repaired fire alarm boxes 454, 331, 113 and master box at Desert Inn. Repaired traffic controller at Community House, flood lights at Columbia Play Field, buffer at Library, and relamped Heavy Equipment Shop in Transportation Area. Installed new conduit and wire for outside lighting at Sewage Treatment Plant. Removed old pole which was a hazard to navigation in Columbia River at foot of Lee. Replaced and repaired 3 motors in domestic water wells struck by lightning. Dug holes and set poles for 6 steam line poles in 700 Area. Trimmed trees and transferred Telephone and TV cable as required by Rebuilds.

SUBSTATION AND METER MAINTENANCE

Performed routine transformer and substation maintenance. Overhauled 6 distribution transformers.

OUTSIDE LINES

Installed four 25 KVA transformers so as to obtain capacity for new electric house heating loads. Removed pole at 1018 Cedar and rearranged fire alarm and street light circuits so as to allow tenant to build garage. Ran new service to Lutheran Church addition. Disconnected two buildings at Columbia High School, removed transformer and associated equipment and moved to new building location at School Maintenance Shop on Thayer Driver where the two buildings were again reconnected. Connected and disconnected Concession Row for Atomic Frontier Days. Disconnected all services to boat docks north of Lee. Located broken underground street light wire and repaired by stringing new overhead wire. Relocated secondary wires at Williams & Thayer so as to provide proper fire alarm clearance. Continued with general pole line rebuilding.

CALLOUTS

An unusual amount of callout time was experienced this month due to an electrical storm and some wind damage. One evening there were 13 transformers and 3 lines refused due to lightning. In addition to this there was a general power outage lasting 15 minutes to the northwest quarter of town due to a tree blowing into the main line feeding that area. Five exempt and ten non-exempt men were called out during the month to repair five *cases of trouble

* This covers one evening of general repair work caused by lightning.

COMMUNITY SECTION
ENGINEERING UNIT
MONTHLY REPORT
AUGUST 1956

<u>PERSONNEL</u>	<u>Exempt</u>	<u>Non-Exempt</u>	<u>Total</u>
Employees Beginning of Month	3	4	7
Transfers Out	0	0	0
Transfers In	0	0	0
Terminations	0	0	0
Total End of Month	3	4	7

BUILDING PERMITS

1. A. F. Baxter - 606 Cottonwood - Storage building to be moved from 2003 Kuhn
2. Carl R. Carter - 324 Goethals - Shade over existing patio slab
3. Wm. D. Smith, Jr. - 1325 Cottonwood - Storage and hobby shop
4. D. E. Warner - 1405 Perkins - Carport

NEW MUNICIPAL CONSTRUCTION STARTED

NONE

ENGINEERING JOBS COMPLETED

G-01023 - New Sewage Treatment Plant Road.

STATUS OF ENGINEERING UNIT PROJECTS

- G-01020 - Falley Field Improvements - Contract awarded. Contractor started work May 29, 1956. Construction 90% complete.
- G-01022 - Development of Riverside Park, Newton to North End of Park - Contract awarded. Contractor started work May 29, 1956. Construction 95% complete.
- G-02205 - Additional Street Lights, Richland, Washington - Contract awarded. Construction 35% complete. No progress this month.
- C-0572 - Study of Drainage Ditch from Swift Blvd. to Origin on Wellsian Way - Plans to AEC for approval 3-26-56.

BUILDINGS UNDER CONSTRUCTION

Plans, Specs., Inspections, Central U. P. Church (Alternate #1) - 100% complete.

Plans, Specs., Inspections, Richland Lutheran Church - 75% complete. Work progressing as scheduled. All of rooms may not be completed on this contract.

Plans, Specs., Inspections, L. G. Cook Building - 95% complete. Portions of building now occupied.

Plans, Specs., Inspections, Parker Hansen Building - 95% complete. Portions of building now occupied.

Plans, Specs., Inspections, Parcell's Bulk Station, Wellsian Way - 95% complete. No progress this month. Loading dock lacks roof.

Plans, Specs., Inspections, Charles D. McGuinness - 95% complete. Open for business. Plumbing and roof structure not completed satisfactorily.

Plans, Specs., Inspections, Rice's Rug Service - 80% complete. Addition being used. No wiring installed in it. Openings in existing walls not yet enlarged as planned.

Plans, Specs., Inspections, Pennywise Drug - 40% complete. New roof structure erected to replace one damaged by fire. Interior work to be done.

PROJECTS IN SCOPING AND SMALL STUDIES

Grandstand Seats, Memorial Soft Ball Field

Irrigation System, Memorial Soft Ball Field

Hains Street Sprinklers

Library Addition

Reservoir Roof, North Richland

Uptown Richland Roof Leaks

Bowling Alley Foundation

INTERNAL PROJECTS

Refiling City Engineering Records

Completion of Richland Drainage Map

Maintenance of Map Records

COMMUNITY SECTION
PUBLIC WORKS AND RECREATION UNIT
MONTHLY REPORT
AUGUST 1956

ORGANIZATION AND PERSONNEL

	<u>Exempt</u>	<u>Non-Exempt</u>
Employees Beginning of Month	6	50
Transfers Out	0	5
Transfers In	0	0
New Employees	0	5
Terminations	0	4
Total End of Month	6	46

ROADS AND STREETS

Approximately 235 lineal feet of concrete curb and 1200 square feet of sidewalk was replaced on Lee and Stevens Streets.

Extensive gutter repair work has been done on the 500 block of Benham and the 200 - 300 - 400 blocks of Barth Street. Barth Street is being prepared for seal coating this fall.

Continued patching of asphaltic surfaces as required. Premix blacktop was not available to this unit for a period of 30 days as Transportation lacked the materials for the manufacture. During this time, slurry mix patching was accomplished on an experimental basis. Results to date have been quite satisfactory although it is too early to properly evaluate this type of work. It is evident however, that seal coating should follow for the best results.

197 curb miles of streets were swept this month with 52 cubic yards of debris removed. Also, 24 cubic yards of excess seal rock were removed from Sacramento Street by hand operation.

Materials used this month are as follows: 225 tons Blacktop; 36 cubic yards of 3/4 minus aggregate.

Right-of-way mowing of weeds is under way and much is yet to be accomplished in this work.

A work order for making up of 96 street name markers was issued this month.

A requisition was entered for the purchase of lockers to properly store the personal effects of this crew.

SANITATION

Waste removal during the month required collection and disposal of the following:

Residential:	467 tons
Commercial:	<u>120 tons</u>
Total	587 tons

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PUBLIC WORKS AND RECREATION UNIT

SANITATION (Cont'd.)

Operation of the garbage dump at its temporary location will continue for approximately another month.

PARKS AND PUBLIC GROUNDS

Routine maintenance of assigned lawn areas continued during August: (a) Night watering and (b) Mowing and cleanup of assigned areas.

Progress was made during August on thistle and pollen weed removal. One (1) light driver and sickle bar was used throughout the month.

Maintenance of shelterbelt areas continued during August. Above work somewhat curtailed due to shortage of water for irrigation purposes.

Provided necessary loan labor for operation of Waste Disposal during August such as vacation relief and sickness coverage.

Continued all lawn and shrubbery maintenance at Kadlec Hospital during the month of August.

MOSQUITO CONTROL

Larvacide operations in the Richland control area continued in routine fashion during the month of August.

Working in conjunction with the Richland Health Department and the A.E.C. a plan was developed to spray breeding areas west of the Yakima River by airplane. This was only moderately successful but reduced the migrating mosquito population slightly.

Adulticiding control measures have been curtailed by high winds during the past month.

The midway substation was fogged at the request of the A.E.C.

Materials used during August were: 1175 gals. of Diesel Oil, 350 lbs. of DDT, 100 lbs. of Xylene, and 10 gals. of Lethane.

RECREATION

General

The annual Atomic Frontier Days Celebration was held at Riverside Park Aug. 3, 4, and 5.

The Community House Games Room was the setting for the annual Hobby Show sponsored by the Junior Chamber of Commerce in conjunction with the A.F.D. Celebration. An estimated 3000 people viewed the displays.

The City and District Softball Tournaments were completed at the Memorial Softball Field on Aug. 7, 8, and 9.

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PUBLIC WORKS AND RECREATION UNIT

RECREATION (Cont'd.)

General (Cont'd.)

The Red Cross Blood Bank held its monthly meeting in the Social Hall on Tuesday, August 7.

The Unit's Play-For-Fun League completed its league schedule on Monday, Aug. 1.

The Unit sponsored Triple-O-League season was completed on Wednesday, Aug. 29.

The Doll Show, the last of the special events in the Summer Recreation Program, was held at Riverside Park.

The Band Concert of August 29 was the finale of six (6) concerts sponsored by our Unit and held in conjunction with the Summer Recreation Program at Riverside Park.

The Unit's Summer Playground Program closed on Friday, August 24.

All but one (1) of the boat docks were relocated from Riverside Park to the waterfront immediately south of the park. The Unit has now assigned five (5) group docking permits and twenty-four (24) individual permits.

Attendance Statistics - August 1956

	<u>No. of Sessions</u>	<u>Youth</u>	<u>Adults</u>	<u>Sut Total</u>
A. <u>Community House</u>				
AAU Boxing	11	77	67	144
Red Cross Blood Bank	1		300	300
Arts & Crafts	11	179	12	191
Business Girls' Bowling League	1		12	12
City Council	2		35	35
Colt League	2	3	36	39
Columbia Basin Sports Officials	1		25	25
Desert Knights	2	14	32	46
Fencing	3		11	11
Games Room	23	1 121	159	1 280
Gentrics	1		35	35
Hi Spot	8	2 278	32	2 310
Hobby Show	4	1 000	1 015	2 015
Instrument Bowling League	1		8	8
Intermediate Bowling League	1		50	50
International Folk Dancers	5	5	62	67
Maintenance #2 Bowling League	1		10	10
Men's Bowling League	1		11	11
National League	1		8	8
Perry Thompson Boat Organization	1		15	15
Pony League	1		15	1
Rec-A-Teers	5		359	359

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PUBLIC WORKS AND RECREATION UNIT

RECREATION (Cont'd.)

Attendance Statistics - August 1956 (Cont'd.)

	<u>No. of Sessions</u>	<u>Youth</u>	<u>Adults</u>	<u>Sub Total</u>
<u>A. Community House (Cont'd.)</u>				
Richland Basketball Assoc.	1		4	4
Richland Chess Club	5		18	18
Rich. Women's Bowling Assoc.	1		30	30
Social Security	2		63	63
Stamp Club	1		20	20
Women's Bowling League	1		60	60
Women's Major Bowling League	1		60	60
YWCA (Style Show)	1	29	47	76
Total Community House	100	4 706	2 611	7 317
<u>B. Parks and Playgrounds</u>				
Wellsian Lake	31	1 240	275	1 515
Ball Field Bookings	35	425	205	630
Memorial Softball Field	20	500	2 620	3 120
Picnic Bookings	35	900	1 550	2 450
Playlots	30	6 600	3 300	9 900
Triple-O-League	4		720	720
Play-For-Fun League	2	80	100	180
Jefferson Tournaments	2	475	800	1 275
Columbia Baseball	15	250	740	990
A.F.D. Celebration	3	11 000	9 000	20 000
Riverside Park	20	3 900	2 345	6 245
Columbia Playfield	20	1 802	2 356	4 158
Total Parks & Playgrounds	217	27 172	24 011	51 183
<u>C. Summary</u>				
Community House and Parks and Playgrounds total for August 1956	<u>317</u>	<u>31 878</u>	<u>26 622</u>	<u>58 500</u>
Calendar Year to Date				<u>264 313</u>

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COMMUNITY OPERATIONS
WATER AND SEWERAGE OPERATION.
MONTHLY REPORT
AUGUST 1956

ORGANIZATION AND PERSONNEL

	<u>Exempt</u>	<u>Non-Exempt</u>
Employees Beginning of Month	6	27
Transfers Out	0	0
Transfers In	0	0
New Employees	0	0
Total End of Month	6	27

DOMESTIC WATER

Normal operations were continued throughout the month.

Some difficulty was encountered in maintaining a sufficient underground water table at some of the 3000 area wells to continue a maximum rate of production. This condition was apparently due to the sedimentation basin and the north half of the percolation basin silting and reducing the water percolation rate. Through the cooperation of the Parks Group and the Schools, in controlling their water usage, we were able to maintain an adequate supply of water during the excessive warm weather.

An electrical storm on August 23 resulted in a short interruption of water service to the highest elevations of the system when all the water supply pumps were kicked out by a momentary power interruption. Two separate electrical storms this date resulted in damage to two 75 H. P. well pump motors to the extent the motors had to be removed and dismantled for repairs to the windings.

DOMESTIC WATER DATA

	<u>Well Production</u>	<u>Av. Da. Prod.</u>	<u>Total Consumpt.</u>	<u>Av. Da. Cons.</u>
Richland	198,670,000	6,408,700	668,794,000	21,574,000
North Richland	463,180,000	14,941,200	38,736,000	1,249,500
Columbia Field	112,994,000	3,644,900		
300 Area			64,609,000	2,084,100
Total	774,844,000	24,994,800	772,139,000	24,907,600

Maximum daily production 29,706,800 gallons on August 7, 1956.

Maximum daily consumption 30,844,600 gallons on August 6, 1956.

SEWERAGE SYSTEM

Normal operations and routine maintenance have been continued throughout the month.

1102279

WATER AND SEWERAGE OPERATION

Overhaul work on the large hot water boiler at No. 2 Sewage Plant has been completed. The sludge heat exchanger was completely dismantled and cleaned and the primary digester was taken out of service for cleaning and maintenance work.

SEWERAGE DATA

Plant No. 1 Total Flow	50,880,000	Average Daily Flow	1,641,200
Plant No. 2 Total Flow	<u>89,580,000</u>	Average Daily Flow	<u>2,889,600</u>
Total Flow	140,460,000		4,530,800

IRRIGATION SYSTEMS

Normal operations have been continued throughout the month.

The irrigation canal through Richland was shut down for three days for aquatic weed control.

COMMUNITY SECTION
RICHLAND PUBLIC LIBRARY
MONTHLY REPORT
AUGUST 1956

<u>ORGANIZATION AND PERSONNEL</u>	<u>EXEMPT</u>	<u>NON-EXEMPT</u>
Employees beginning of month	4	10
Transfers in	0	0
Transfers out	0	0
New hires	0	2
Terminations	0	2
End of month	4	10
 <u>GENERAL</u>		
<u>Circulation</u>		
Books	20,325	
Magazines	426	
Pamphlets	47	
Records	985	
Interlibrary loans	59	
Grand Total		21,842
 <u>Current Book Stock</u>		
Books added this month	268	
Books withdrawn this month	0	
Grand Total		39,490
 <u>Registration</u>		
Adult	148	
Juvenile	51	
Juvenile registrations dropped	39	
Net Total	160	
Total registered borrowers		22,422
 <u>Meetings in North Hall</u>	3	
 <u>Children's Story Hour Attendance</u>	180	(3 story hours)

Park story hours were discontinued August 21, 1956. Pre-school and school-age story hours in the library will resume October 1, 1956.

230 children have completed reading and reporting on ten books to become winners in the Children's Summer Reading Club.

Miss Marie Golubski, Children's Librarian, has told stories to five youth groups this month, four at Camp Kiwanis and one at Camp Hanford. Total attendance at these story hours totaled 392.

AUXILIARY OPERATIONS AND PLANT PROTECTION SECTION

MONTHLY REPORT - AUGUST 1956

ORGANIZATION AND PERSONNEL

Number of employees on roll:

	<u>Beginning of Month</u>	<u>End of Month</u>	<u>Increase</u>	<u>Decrease</u>
Staff	2	2		
Administration Area Maintenance	104	104		
Security and Patrol	468	464		4 (a)
Fire Protection	128	129	1 (b)	
Office Auxiliaries	121	122	1 (c)	
Telephone	80	84	4 (d)	
TOTALS	903	905	6	4

NET INCREASE: 2

(a) - Security and Patrol

- 1 - Reactivated
- 2 - Transferred in
- 1 - Deactivated
- 6 - Terminations

(b) - Fire Protection

- 3 - New Hires
- 2 - Transferred out

(c) - Office Auxiliaries

- 16 - New Hires
- 3 - Transferred in
- 1 - Reactivated
- 17 - Transferred out
- 2 - Deactivated

(d) - Telephone

- 4 - New Hires
- 2 - Transferred in
- 2 - Terminations

FIRE PROTECTION UNIT

Fire Responses

HAPO	6	Loss	---
Outer Areas	4	Loss	---
Construction	2	Loss (Private) AEC	\$150.00 Est.
		L.A. Hopkins)	725.00 Est.

Description of Fires

Engineering - Minor Projects Sub-Section, Minor Construction
200-East, Time 1:20 PM, 8/3/56

Minor construction workers, using cutting torch, accidentally fused protectowire actuating alarm No. 52, old Blaw-Knox pipe shop. No fire.

Engineering - Separations, Process Planning
300 Area, Time 3:18 PM, 8/3/56

An employee of the 321 Building accidentally struck the tripping lever of an auxiliary box thereby transmitting master box No. 52. Accidental alarm, no fire.

AEC Construction - Lewis A. Hopkins, J. P. Head
100-K Area, Time 5:28 PM, 8/3/56

Construction employees, welding at the 1704-K Building, had a minor fire which they assumed extinguished after using a CO₂ extinguisher. This incident occurred in the morning and was not reported to the Fire Department. Response to box alarm No. 21 at 5:28 PM was to the same location and was probably a rekindle of the previous fire. Private loss was estimated by AEC at \$150.00, by Lewis A. Hopkins at \$725.00.

Manufacturing - Metal Preparation, Materials
300 Area, Time 8:42 PM, 8/7/56

Fire caused by short in electrical control wires of fork lift truck No. HO 75-500 operating at the 313 Building. Fire extinguished by employee using CO₂ prior to arrival of Fire Department. No loss.

AEC Construction - Frank H. Lohse, Contractor
300 Area, Time 12:10 AM, 8/14/56

Construction employee, using welding torch during erection of metal walls at 3745 Building, ignited insulating material between wall sections causing a smoldering fire. Extinguishment accomplished by Fire Department. No loss.

Grass Fire - Northeast of Minor Construction
White Bluffs, Time 3:26 PM, 8/16/56

Grass fire, probably caused by carelessly discarded smoking material northeast of the Minor Construction area. Confined to approximately two acres. No loss.

1102204.

Outer Area, Time 3:39 AM, 8/23/56

Lightning ignited sagebrush resulting in a strip 20 by 100 feet being burned over. Rain controlled fire, extinguishment completed by Fire Department. No loss.

Manufacturing - Reactor, 100-B & 100-C Power Operations
100-B Area, Time 6:56 PM, 8/23/56

Normal breakdown of electrical motor caused by overheating, ignited insulation on wire. Fire was confined to 800 H.P. motor located on the main floor of the 190-B Building. Extinguished by employee using CO₂ prior to arrival of the Fire Department. No loss.

Outer Area, Northeast of 300 Area, Time 6:55 PM, 8/23/56

Electrical storm ignited grass and sagebrush. Fire extinguished by rain as fire trucks arrived. No loss.

Outer Area, South of Hanford near River, Time 12:17 PM, 8/24/56

Cause unknown, probably ignited by previous days' electrical storm. Approximately 10 acres burned over. No loss.

Engineering - Separations, Design & Development
200-East, Time 2:55 PM, 8/26/56

Moisture in Protectowire caused short in No. 2 and 3 circuits, actuating master box No. 35 at 275-EA Building. No fire, no loss.

Manufacturing - Transportation, Equipment Maintenance
Radiological Sciences, Radiation, Records & Standards
Outer Area, Time 11:45 AM, 8/31/56

Collision between pickup HO-1C-3949 and truck HO-68B-5984 one mile east of 200-East badge house. Responded with tank truck to wash down spilled gasoline to prevent fire. No fire, no loss.

Drills Held During August

Outside drills held	110
Inside drills held	103

Two fire demonstrations were conducted, in 329 building, 300 Area and 2709-W Building, 200-West Area. A total of 23 plant employees attended the demonstrations.

Ten members of the Power Department, 183-BC, 100-B attended a class and demonstration on Chemox masks.

Instructions and a demonstration on artificial respiration was conducted for 19 members of the Power group in the 200-East Conference Room.

A class in advanced First Aid was held for six members of "B" shift Fire Protection personnel in the 300 Area.

1102285

Fire Extinguishers

Inspected	1,549
Installed	25
Delivered to new locations	8
Seals broken	38
Serviced	191
Weighed	219

Gas Masks

Inspected	57
Serviced	6

OFFICE AUXILIARIES SUB-SECTION

Comparative volume statistics are higher for the current period in most phases of the work due to the reporting cut-off date being extended from the 22nd of the month to the end of August.

Plant Mail Unit

Inter-office and postal mail both increased in weight and volume during the past period and reached a record high. Revisions to the mail boards are constant and the efforts to give uninterrupted mail service have been successful in most cases. Delays due to the necessity of look-up mail have been kept at a minimum.

Special assignments were unusually numerous during the past period due to the impending organization change and consisted of assembling charts, directories and information of all types for the various departments. Portions of the work were applicable to the machine and the parts which were not done with assistance from the Stenographic Pool. Thirty-two such assignments were accomplished during the last two weeks of this period. Other assignments included booklets, "Fact Not Fiction" (cancer booklet), "Polio Vaccination Now," "Evening Study Program," "Worry Go Round," and "May We Suggest" plus sixty-eight additional plant mailings and one mailing to all employees at the home addresses.

New plates are in the process of being cut for all departmental lists and the home address plates are being tabbed by departments. Information to complete the jobs of plate cutting has been delayed by some of the departments who were not firm on assignments and personnel locations, but the following are completed: Irradiation Processing, Fuels Preparation, Relations and Utilities, and partial on Chemical Processing Operation on plant addresses only and partial on home addresses on all the departments. Collating work exceeded all previous records.

<u>Types and Pieces of Mail Handled</u>	<u>July</u>	<u>August</u>
Internal	2,963,699	5,939,029
Postal	59,653	113,064
Special	1,076	2,258
Registered	8,059	9,394
	3,032,487	6,063,745

1102286

Plant Mail (Contin)

	<u>July</u>	<u>August</u>
Total Postage used	\$ 1,799.63	\$ 3,843.40
Total Teletypes Handled	1,665	2,950
Total Store Orders Handled	396	850

Addressograph

	<u>Number of Total</u>		<u>Number of Total</u>	
	<u>Runs</u>	<u>Copies</u>	<u>Runs</u>	<u>Copies</u>
Plate name List	121	172,341	122	174,279
Housing List	18	43,185	23	54,382
Payroll List	3	4,261	4	7,018
Total New Plates	3,131		12,396	
Total Corrected Plates	4,186		9,824	
	7,317		22,220	
Machine Collating (sheets)	164,011		232,289	

Printing Unit

As a result of a notice published in the July Management News Bulletin, that scratch pads were available free of charge from Printing, about 1,275 pads were distributed on 131 requests. The use of scratch pads instead of Don't Say It-Write It pads will effect savings for the operation due to the use of scrap.

Thirty-six orders were completed on priority requests for pre-printed duplimat masters, representing a total of 13,560 masters pre-printed.

Fifty-three documents of various classifications were handled and completed during the month.

One Top Secret order having forty-five masters requiring five copies each was completed for AEC.

<u>Work Completed</u>	<u>July</u>	<u>August</u>
Orders Received	228	583
Orders Completed	244	510
Average Orders on hand	56.8	91 2
Copies Printed	437,946	1,798,418
Vacuum Frame Plated Masked	305	621
Negatives Processed	383	818
Photo Copy Prepared	294	374
Litho Plates Processed	373	718

Stenographic Unit

Two Stenographers and twelve Stenographer-Typists were assigned to the Unit in August. Fourteen transfers were made to other plant units and arrangements completed for eight transfers to become effective in September. Two employees terminated, one to return to school and one to teach school. Forty loan assignments were made to other plant offices.

Work was performed on 104 Stenographic orders against 82 cost codes for 121 people. The work load was consistently heavy throughout the month, due largely to paper work to be done in connection with the reorganization. All work is current at month's end.

The growing number of open personnel requisitions for stenographic personnel is resulting in many more requests for loan assignments than the Unit is able to fill.

	<u>July</u>	<u>August</u>
Total Production Hours	2,197.5	4,573.5
Training Hours	157	364.5
Unassigned Hours	77.5	159
Meeting Hours	4	4.5
Holiday Hours	64	0
Absentee Hours (with pay)	0	0
	2,500	5,101.5

OFFICE EQUIPMENT UNIT

Office Furniture

A total of 111 service orders and nine work orders were issued. There were 549 debit and credit store orders processed during the month. A large number of requests for equipment were received during the last two weeks of the period due to de-centralization. Each request will be carefully screened to eliminate duplications that result from insufficient information about the movement of equipment and personnel.

One off-site trip was made to Whidby Island Naval Air Base to inspect lunch room tables which are available on excess. There were 42 tables ranging from 16 to 20 seats per table or a total of 675 seats. Our cost to purchase and install these tables would be freight charges plus cost to have bases painted and tops cut to fit our lunch rooms. These costs would not exceed an estimated figure of \$1,750. New tables would cost approximately \$18,000, or a savings of \$17,250 in cost to replace old park bench-type tables now provided and in need of replacement. The Naval Station will be releasing the tables some time in the month of October and we are preparing to obtain them.

An appropriation request was issued and approved for purchase of 100 file cabinets and 20 stationery cabinets.

1102288

Office Furniture (Contin)

Office furniture and machines located with J. A. Jones Co. offices were inventoried and records were posted to maintain a physical inventory balance to date.

In preparation of sale of Kadlec Hospital, assistance was provided Plant Accounting in taking inventory of office furniture and machines.

Office Machines

A total of 4,193 machines were in service and stock on August 20, 1956. A total of 34 machines were excessed and deleted from Office Equipment Inventory. Fourteen new Remington Rand Electric Typewriters were issued in exchange for 14 machines programmed for replacement.

A total of 42 electric typewriters have been prepared for excess to Stores. These machines have been replaced by new machines purchased from FY-56 funds.

It is contemplated that a sufficient number of machines will be available to fill the additional requirements received from newly activated functions required in the new organization.

Bookkeeping machines were allocated to the departments justifying the need of machine postings. These machines were programmed and carriage panels were forwarded to Burroughs Spokane plant to be revised to accommodate General and Plant ledger postings.

Office Machine Repair Unit

The Branch Manager of the Portland, Oregon, Monroe Calculating Company office visited during the month. His primary reason for calling was to introduce his successor. While here, he also reviewed the latest developments in punch tape equipment that the Monroe Company has to offer.

One model 1900 Addressograph was completely cleaned and overhauled before being assigned to the 100-H Mail and Duplicating office.

Two new Flexo-writers were received by the 100 Area operations. We were requested to completely check machines before putting into operation. Even though these machines were new, they were badly out of adjustment. One Instrument Technician and Office Machine Repairman spent about 5 hours each on each machine, or a total of 20 hours, checking adjustments before equipment was ready to go into service.

Instrument mechanics installed one new time clock in the present Medical Dental Building which will be the new location of G.E. Industrial Medical.

An order was received to install one additional time clock in the office of warehouse No. 15.

Instruments overhauled one Republic damper control at the 784 Power House.

Sewage disposal flame control equipment was completely checked for proper operation.

Office Machine Repair Unit (Contin)

Approximately 100 repair tickets for August were not put on IBM run and will be added to September total

Repair tickets processed:	<u>July</u>	<u>August</u>
	500	502

Duplicating Unit

During the month, a trial installation was made of a Playtex applicator and a blanket wash-up device on one Model 1250 Press in 703 Duplicating. These two devices are recommended by the vendor as time-saving attachments. In addition, the blanket cleaning device has possibilities toward the reduction of solvent fumes around the machine work area.

Meetings were held with office services personnel for Fuels Preparation Department and Chemical Processing Department to provide information and assistance for those individuals who will be supervising the various duplicating functions under a de-centralized organization.

	<u>July</u>	<u>August</u>
Orders Received	2,337	4,380
Orders Completed	2,311	4,267
Orders on Hand	1,324	138
Offset Plates	11,077	20,542
Offset Copies	621,719	1,427,475
Verifax Masters	2,791	5,254
Verifax Copies	10,619	16,203
Ditto Masters	138	242
Ditto Copies	1,239	3,910
Embosograp Masters	8	120
Embosograp Copies	39	708
Xerox Plates	1,179	2,107
Ozalid Masters		200
Ozalid Copies		1,633
Copies Duplicated	635,021	1,452,036

ADMINISTRATION AREA MAINTENANCE SUB-SECTION

The annual Landlord Report was completed.

One-hundred and sixty office moves were made during August.

Appropriation request for FY 1957 supply of movable partitioning was approved on August 9 and purchase requisition is in process of preparation.

Two partitions were removed and one installation made in 700 Area. Stock s supplied for one installation in 200 Area.

Receipt of partition order, processed in June, is anticipated shortly after September 1.

1102290

Revision of Civil Defense siren circuits has been delayed, awaiting receipt of parts by Telephone Sub-Section. This shipment is expected in September and it is anticipated that changeover will be completed by November 1.

Several short sections of asphalt walk were installed in 700 Area.

Building and Equipment Maintenance

Alterations to interior of Building 713 to provide additional office space and lunch room for employees of the computing group were completed. The work included installation of 203 lineal feet of Hauserman partition, 6 steam radiators, 16 fluorescent light fixtures, 8 convenience outlets, and a sink with hot and cold water connections.

Work was started on repair of the roof of the north half of the third wing of 703 Building. Application of "Mighty Plate" primer and fiber glass sheeting is complete. A coat of sealer and a coat of aluminum roof paint will be applied as curing permits.

Cycle painting completed this month included the entire east corridor, a ladies' and a men's restroom, and three offices in Building 760, and three offices in 703 Building.

All pressure relief valves in the 700 Area were inspected, repaired and adjusted as necessary.

Thirty old style large radiators were removed from Building 761 and replaced with small radiators, which allow for more efficient utilization of office space.

To more adequately hold humidity within allowable limits in the "EDPM" room of 713 Building, a cooling coil was installed in the air-flow adjacent to the spray chamber to condense water vapor, and the water sprays were changed from continuous operation to operation only when additional humidity is required.

Major overhaul of No. 1 boiler at 784 was completed. This completes major work at the steam plant scheduled for this summer season.

Conversion of obsolete types of convenience outlets to ASA type was completed on 50 outlets - 30 in Building 717-A and 20 in Building 713.

Spray painting of 160 cross walks and 56 "School Zone" markers on Richland streets was completed for Community Section.

A cashier's cage and two window security screens were constructed and installed in W-16, at the request of AEC, for use of HHFA.

Miscellaneous work completed in the 700 Area included: removal of a 16' frame partition and a clothes closet in W-10 to provide for more class room space; replacement of worn exterior steps on 704; installation of a roof-mounted exhaust fan with ducting to remove ammonia fumes from an Ozalid machine in 760; installation of an additional bank of dust filters in the "Buffalo" unit at 712;

Building and Equipment Maintenance (Contin)

repadding of evaporative coolers at W-16, 17, 21, 704, 707, 723 and 770; fabrication of a guard for table saw at 729; repair of coal conveyor sprocket at 784; replacement of bearings in motor-generator at 702; installation of a new 100 amp service in 713; relocation of four light fixtures in the stairwells of fifth wing of 703 to facilitate replacement of lamps; and installation of one exhaust fan in 760, one buzzer system in 770-A, and one light fixture in W-20.

Items of service completed for Transportation Section included: test and repair of all pressure relief valves at 1170 and 1171; inspection and repair of 60 portable electric tools; adjustment and lubrication of all zone blower fans at 1171; seasonal overhaul and cleaning of 1171 steam boiler; installation of a control switch for wash rack motors, and an electrical circuit for the sand elevator; installation of security screens on nine new panel trucks; overhaul of one light plant and five alternators; placement of concrete forms for hutment to be set at meteorology tower; fabrication of a 7' x 12' drag broom for road crew; placement of 36 creosoted posts as footings for relocated building at Hanford, and construction of two 8' x 10' exterior landings and stairs at this same building; and relamping of 1170 and 1171, the barricades and meteorology tower.

At Central Stores all pressure relief valves were tested and repaired; the steam boiler was overhauled and cleaned; and 40 man hours were utilized in crating excessed materials.

Routine maintenance was continued on all buildings and equipment in the 600, 700, Central Stores and Transportation Shops areas, and locksmith and glazing service was furnished to all areas.

Building Services

All windows were washed in the fifth wing, second floor of Building 703.

Venetian blinds on both floors of the third and fourth wings of 703 were removed, tank-washed and replaced.

Protective floor seal was applied to wooden floors in Buildings 760, 761 and 762.

Color seal was applied to concrete floors in 704 and 707, the restrooms in 723, and offices, lunch rooms and restrooms of 716.

Routine janitorial and relamping service was continued per schedule in 700 Area buildings, Central Stores, and Buildings 1170 and 1171 of Transportation Section.

Steam Operation

No. 2 boiler was in service at the beginning of the month, with Nos. 3 and 4 in reserve and No. 1 undergoing biennial major overhaul.

On August 27, No. 4 boiler was placed in service and No. 2 unit removed from the line preparatory to overhauling this unit at a later date; until then No. 2 boiler will remain in a reserve status.

Steam Operation (Contin)

The quantity of steam generated at the 784 Plant was 7.3% less than for the same period of the previous year.

One load of sulphuric acid was sent to 384 Power House.

Work of sealing oil and coal leaks on the coal conveyors was continued.

Instrument maintenance repaired the Republic furnace pressure regulator on No. 2 Boiler.

A new water meter was installed in 784-A Building on the soft water line to Kadlec Hospital on August 15. This new meter will pick up the low flows which did not register on the previous meter. Hence metered soft water to hospital can be expected to increase.

New valves were installed on the steam branch lines serving the 1146 Public Health Building and the 1181 and 1182 Pump Houses.

Instrument maintenance removed, cleaned, calibrated and replaced the Foxboro steam flow meters at Carmichael Junior High and Columbia High Schools, for the first time since their installation in the fall of 1950.

Test-fired boiler at Central Stores Heating plant following annual cleaning of this unit. Both electronic tubes of the Fireye flame failure control were replaced. Boiler safety valves were pressure popped at 96 pounds by raising steam pressure above normal 60 p.s.i. cut-off point by electrically bypassing high pressure cut-off control.

Relief valve on low pressure (15 p.s.i.) steam system was popped in place as valve cannot be readily removed from line for bench testing.

At request of Stores landlord personnel, steam-heated domestic hot water heater was placed in service and tested. This unit, which had not been used in the past, will now be operated (when boiler is in service) to overcome deficiency of hot water experienced in cold months.

Coal consumed:	429.15 tons
Steam generated:	6,111.1 M. lbs.
Steam leaving plant:	5,110.8 M. lbs.
Steam delivered:	2,878.8 M. lbs.
Total water softened:	1,025,700 Gallons
Total soft water sent to Kadlec Hospital:	95,880 Gallons
Total soft water sent to 784 Power House:	929,820 Gallons

TELEPHONE SUB-SECTION

Annual vacations for telephone and radio employees were 63% complete on August 31.

Two representatives of the Sub-section visited the Western Engineering Company in Spokane on August 29 and 30 to inspect new type General Electric microwave radio equipment and to hear a microwave engineer explain various features of the equipment.

he Hanford Operations Office was requested by letter to obtain necessary authorization for the use of several new radio frequencies that will be required in connection with the CG-673 radio replacement and modernization program.

An AEC approved request was received from the General Telephone Company of the Northwest to obtain and furnish to them data on manually handled traffic from community telephones. The requested data are to be obtained with equipment to be furnished by the telephone company. The equipment has not yet been received therefore no information has been furnished to date.

Over 600 telephone service orders were prepared by the Telephone Business Office during the last two weeks of the month, practically all of which were incidental to reorganization personnel moves.

Plant Telephone Operations

Relocated and installed approximately 60 telephones in existing and new office space made available in the 306 Building by Project CG-546.

Installed an 11-pair cable terminal at the Transportation Center to provide operational circuits for teletype and telephone facilities located in the Civil Defense mobile trailers when they are parked at the Transportation Center.

Installed a telephone answering turret in each of the patrol radio rooms in the 100-D, 100-F and 100-H areas. Each of these turrets replaced several individual items of telephone equipment.

Installed a long-line unit at the BY Telephone Exchange for the purpose of extending the operating range of fire reporting telephone 2-4401 to permit calls from the B, C and K areas to be received and answered at the White Bluffs Fire Station.

Assisted connecting telephone company personnel in observing and testing the Spokane leased line to determine the cause of frequent false signals. The trouble was located in carrier equipment in the Spokane termination.

Cable crews and installer-repairmen spent approximately 50% of their time during the month making system additions and rearrangements and telephone installations and relocations as necessary to fulfill partially the requirements of the HAPO reorganization. Major work items accomplished included:

Installation of 1150 lineal feet of cable and a terminal to serve the 2713-E Building.

Installation of a short lateral cable and a cable terminal for the 1717-B Building.

Rearrangement of the service entrance, protective equipment and service wires at the 1709-H Building.

Installation and relocation of approximately 350 telephone instruments.

1102294

Plant Telephone Operations (Contin)

Maintenance of PAX and PBX systems in the 202-A, 271-T, 202-S and 234-5 Buildings required 100 man hours.

Job specification P-57-4 was prepared to cover a needed cable addition in the 200-East Area.

Job specification P-57-6 was prepared to cover a needed cable addition in the 100-B Area.

Checked telephone requirements in the 1709-H Building and arranged to have area electricians install necessary conduit for telephone distribution within the building.

Prepared and processed Appropriation Request 57-EX-3 in the amount of \$3500 to cover the cost of telephones and associated items needed during the first six months of FY-57.

Commercial Telephone Operations

Completed installation of traffic meter switches in the Richland Exchange which greatly increased the metering ability of the existing traffic meters

Changed the pair count of the cable and terminal serving the Public Health building in order to make available additional circuits to the Medical Dental Center to serve Industrial Medicine offices in their new location.

Installed eight additional test valves in the Kennewick trunk cable for checking gas pressure.

Installed a ballast lamp board in the Richland Exchange to distribute central office ringing current to PBX switchboards in Richland.

Repaired damage to two cables in the south end of Richland, one of which was damaged by lightning.

Completed extensive maintenance work on the Pasco trunk cable, locating and repairing several sheath and sleeve defects that have been discovered since the cable was put under gas pressure.

Prepared job drawings relating to replacement of three poles in the Pasco trunk cable lead on the east side of the Columbia River. Two of these poles are being replaced to provide additional vertical clearance and the third is a replacement of a rotted pole.

Added ringback tone feature to all the cord circuits in the Kadlec Hospital PBX switchboard. This results in better service to subscribers and improved the operator's relations with telephone users.

Defective ball bearings in the No. 4 motor generator set in the Richland Exchange were replaced.

A new type wiring plan was installed in the Nation Bank of Commerce on August 4 to provide dial communication among the bank telephones; a feature not previously available.

Radio System Operations

Removed five mobile radio sets from automotive vehicles and installed nine sets in other vehicles.

On August 23, a radio station (KKE 624 #7) was installed in the 200-West Area Fire Station.

On August 29, a radio station (KKE 624 #12) was installed in the 300 Area Fire Station.

On August 29, Radio Maintenance personnel temporarily installed public address equipment in the Desert Inn Hotel for Mr. W. E. Johnson's meeting with managers.

On August 31, the intercom equipment formerly used by Union Relations in the 703 Building was removed.

Shop serviced 41 mobile receivers, 34 mobile transmitters, two fixed-station receivers, two fixed-station transmitters, four pack type receiver transmitters, four audio amplifiers, one radio receiver and three intercom systems.

Field serviced 73 mobile radio sets and one fixed-station unit.

There were no radio outages during the month of August.

Statistical Data

	<u>At 20th of August</u>	<u>Change from Previous Month</u>	<u>Change From Year Ago</u>
Residential Subscribers	6170	-27	/411
Business Subscribers	407	- 2	- 54
Paystations (North Richland)	13	None	- 3
Paystations (Richland)	50	None	/ 4
Official Subscribers:			
Richland Exchange	232	None	- 12
700-1100 Areas	941	- 1	/ 71
Process Areas Exchanges	1669	/ 1	/ 35
		-29	/452

New Service Requests Received During the Month:

For residential service	93
For business service	4
TOTAL	97

Service Orders Processed:

In connection with business & residential service	451
In connection with plant service	401
TOTAL	852

1102296

Telephone Facilities - Installed, In Service and Available

	<u>Exchange Lines</u>			<u>Unassigned</u>
	<u>Installed</u>	<u>In Service</u>	<u>Unassigned</u>	<u>Party Lines</u>
North Richland	600	13	587	
Richland Community	4022	3716	306	961
700-1100 Areas	1230	923	307	
Process Areas	2050	1659	391	
	—	—	—	—
	7902	6311	1591	961

Radio Stations - In Service

	<u>At 20th of</u>	<u>Change from</u>	<u>Change from</u>
	<u>August</u>	<u>Previous Month</u>	<u>Year Ago</u>
Fixed Stations	34	0	0
Mobile Stations	161	0	+ 7
	—	—	—
	195	0	+ 7

SECURITY AND PATROL SUB-SECTION

Document Report

Number of classified documents and prints unaccounted for as of August 1: 288
(96 of the above 288 documents are chargeable to du Pont Company)

Number of classified documents and prints reported as unaccounted for during August: 1

Number of classified documents and prints either recovered or downgraded in security classification during August: 0

Number of classified documents and prints remaining unaccounted for as of September 1, 1956: 289
(96 of the above 289 documents are chargeable to du Pont Company)

Security Education

Eight items which appeared in the GE NEWS were concerned with the subject of security.

Three hundred and sixty-four security meetings were held and attended by 4,459 HAPO employees. A representative of the Plant Protection Services Unit showed one of the security films at some of these meetings or presented the tape recording of Ronald Reagan's recent lecture at Hanford, as indicated below:

Security Education (Contin)

<u>Film Title</u>	<u>Number of Meetings</u>	<u>Average Attendance per meeting</u>	<u>Total</u>
In Any Direction	11	22	242
Handle With Care	3	25	75
Turn Left Across the Bridge	2	13	26
Only the River	2	45	90
Ronald Reagan's Lecture on "Communism in Hollywood"	3	42	126

Six hundred and fifty copies of the security poster with the slogan "Moving a Secret? Security helps you send or receive," were posted in the plant areas during this reporting period.

Two thousand copies of the "A-B-C" security pamphlet with the slogan "Classified Repositories and their Combinations" were distributed to employees during August.

The security "mobiles" in the area badge houses and 700 Area were changed during August. The new slogan of security interest is "Round Up Loose Documents."

One hundred and five employees of the General Electric Company received a "Q" security orientation talk from either a representative of the Plant Protection Services Unit or a Patrol Supervisor, and fifteen employees received the "L" security orientation lecture during the same period.

Statistical Report of Patrol Activities

	<u>100-B</u>	<u>100-D</u>	<u>100-F</u>	<u>100-H</u>	<u>100-K</u>	<u>200-E</u>	<u>200-W</u>	<u>300</u>
Pat Searches	93	22	57	12	34	0	0	1
Escorts	4	25	36	44	6	124	150	4
Ambulance Runs	0	2	1	3	3	1	4	3
Passes issued:								
One day temporary	23	9	11	11	13	5	14	38
Travel	0	0	7	0	0	0	0	122
Red Tag	185	34	31	11	38	158	228	89
Telephonic	0	0	0	0	0	0	0	16
Supervisor's Post Contacts	439	210	182	130	406	306	392	223

Other Patrol Activities (computed by hours): 300 &
700

File check	200	204.5	311.5	446	372	280	280	2,294
Building Check	352	122.25	231.6	1074.5	372	280	280	744

Arrest Report

<u>Violation</u>	<u>Number of Violations</u>	<u>Cont. Cases From July</u>	<u>Cases Cleared</u>	<u>Cont. & Pending</u>	<u>Fined</u>	<u>Dismissed</u>
Legal Parking	9	14	12	11	11	1
Speeding	1	0	1	0	1	0
TOTALS	10	14	13	11	12	1

1102298

Arrest Report (Contin)

Citation tickets issued:	10
Verbal warnings:	0
Warning tickets issued:	39

Patrol Training Activities

357 Patrolmen attended Round Table meetings, safety and security meetings during the month. There being only 389 patrolmen on roll, some of them attended more than one meeting.

341 Patrolmen attended Firearms training during the same period.

Security Audit and Inspection

The second annual cycle concerning the audit and inspection of custodians of classified material, which was started September 1, 1955, by our Security Audit and Investigation Unit, was completed at the close of this reporting period.

Security Administration

Daily Badge Log entries	3,280
"Q" Clearances	105
"L" Clearances	15
Formal "P" clearances issued	51
"P" Approval clearances issued	61
Category Access granted	58
Category access withdrawn	57
Category access revised	72
Number of photos for "A" badges	64
Number of photos for "B" badges	313
Number of persons rephotographed	37 (GE Personnel)

Number of photo identification passes laminated and issued: 472

"A" badges assembled and distributed to the areas:	762
"A" badges received from the areas:	365
"A" badges received from the areas for repair:	29

Top Secret Clearance

Clearances cancelled:	40
Clearances requested:	65
Clearances granted:	62

DECLASSIFIED

HW-45115

DEL

RADIOLOGICAL SCIENCES DEPARTMENT

AUGUST, 1956

SUMMARY

There were nineteen informal, four Class I, and no Class II radiation incidents. One of the Class I incidents involved plutonium intake, which was treated with zirconium citrate as a precautionary measure.

I¹³¹ emission was well controlled.

New techniques offering substantial savings in reactor effluent water sampling were developed.

Training of AEC Radiological Physics Fellows was completed.

A disabling injury occurred on the last day of operation.

1102300

RADIOLOGICAL SCIENCES DEPARTMENTAUGUST, 1956

The month-end force of 437 included 36 supervisors, 102 engineers and scientists, 29 clerical, and 270 other personnel.

Number of Employees on Payroll

Beginning of Month	436
End of Month	<u>437</u>
Net Increase	1

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.

NameTitle of Invention

Frank E. Adley

A device for the control of explosive anesthetic gases during application.

There were 23 radiation incidents including 4 Class I and no Class II incidents. One of the Class I cases involved plutonium inhalation; the employee was treated with zirconium citrate as a precautionary measure.

The average weekly emission of I^{131} was held to the low value of 0.6 curie. Extensive deposition of bomb debris occurred in the early part of the month.

Substantial economies in reactor effluent sampling will develop from a technique that identifies 8 significant radioisotopes without chemical separation. This is a side advantage of the more comprehensive program to make an automatic sample analyzer for all relevant isotopes. Until that device has proved its worth at one reactor area, periodic sampling will be needed at all other areas.

It has been shown that only 6 parts of natural phosphorus in 100 billion parts of water would account for the observed P^{32} concentration in reactor effluent water. This is so far below the reach of chemical analysis that an orderly search for the origin of the phosphorus is hardly justified.

As clearly implied in the Twentieth Semi-Annual Report of the AEC and other references, there is a difference of opinion on the feasible world-wide contamination due to Sr^{89} and Sr^{90} . Local measurements in the bones of animals show values 5 to 60 times greater than those proposed in the more optimistic reports. Discrepancies hinge on the total fall-out occurring and on the randomness of its distribution. A third factor is the alleged preferential selection by animals of calcium compared with strontium. This needs much more refined study than it has received to date.

DECLASSIFIED

1102301

Radiological Sciences Department

Promising results on a sensitive chemical dosimeter using the dye, eriochlorine, were obtained.

One objective of the department is to reduce the understanding of soil retention of radioactive waste constituents to some semblance of a quantitative science. That this is far from accomplished was pointed up by tests on 6 nearly identical tanks of waste. Five showed good retention while the sixth was a dangerous renegade.

Two cases of plutonium deposition in the hand were successfully detected by external signals from the plutonium X-rays; the active material was removed. In one case, careful radiochemical analyses of the removed tissue gave good material balance with the predictions. Autoradiographs showed that the plutonium had remained about 0.7 mm below the skin surface for over 4 years.

The new neutron meter, which by change of moderator thickness reads first the neutron flux and then the effective radiation dose, was successfully used; further refinements can now be foreseen. Incidentally, this device is unique in giving a simple value for the effective average neutron energy.

In the biology programs, worth-while progress was made in the understanding of organ transfer of P^{32} , Sr^{90} , Pu , Cs^{137} , and Ru^{106} ; the results mostly confirmed previous exploratory studies or were themselves exploratory. One exception was a peculiar finding on the uptake of P^{32} in rats fed the "partially dehydrated" reactor effluent water. Here the concentration in the animal tissue was only 10% of that expected from work with the standard effluent. P^{32} is one of the few isotopes that can be comfortably measured for both situations. Until this discrepancy can be resolved, the rest of the data on the souped-up effluent must be accepted with caution.

The direction of the discrepancy is that we could be trapped into concluding that reactor effluent in drinking water could be tolerated at 10 times the real long-term safe concentration.

The training of a group of AEC Radiological Physics Fellows in the joint program with the University of Washington was completed. The value of this training has been carefully reviewed, and radical changes proposed for next year.

This is the last monthly report of the Radiological Sciences Department as such. Unfortunately, the performance of the department was marred by the occurrence of a disabling injury on the last day. This resulted from an automobile accident, which appeared to be caused by the actions of a temporarily assigned employee. This event terminated an experience of 3,870,000 injury-free exposure hours, extending over almost 6 years.



Director,
RADIOLOGICAL SCIENCES DEPARTMENT

HM Parker:kss

1102302

Radiological Sciences Department**DECLASSIFIED**APPENDIX1. Condensed Exposure Records

Type	Number of Readings	Potential High Results	Confirmed High Results
Pocket Chambers-gamma	317,224	46	0
Pocket Chambers-slow neutron	1,928	0	0
Film Badges - beta-gamma	60,534	14	0
Film Badges - neutron	911	0	0
Pu Bioassay	915	18	1
F.P. Bioassay	917	9	0
U Bioassay	333	20	0
Alpha Hand Counts	25,125	0	0
Beta Hand Counts	47,714	0	0
Thyroid Counts	0	0	0

1102303

Radiological Sciences Department2. Regional Monitoring Records

Sample Type and Location	Activity Type	Average Activity Density $\mu\text{c}/\text{ml}$	Trend* Factor
<u>Drinking Water and Related Materials</u>			
Benton City Water Company Well	alpha	1.1×10^{-8}	--
Richland, N. Richland, Benton City Wells	alpha	$(0.5 \text{ to } 1.1) \times 10^{-8}$	--
100 Areas	beta	$(0.05 \text{ to } 3.2) \times 10^{-6}$	+2
200 Areas	beta	$(1.1 \text{ to } 5.0) \times 10^{-7}$	+2
Pasco, Kennewick, McNary Dam	beta	$(0.5 \text{ to } 9.3) \times 10^{-7}$	--
Backwash Solids - Pasco Filter Plant	beta	1.8×10^{-2}	+2
Backwash Liquids - Pasco Filter Plant	beta	1.4×10^{-6}	--
Anthracite, Sand Filter - Pasco Filter Plant	beta	7.0×10^{-5}	--
<u>Other Waters and Related Materials</u>			
300 Area Wells 1, 3, and 4	U	$(2.2 \text{ to } 3.5) \times 10^{-7}$	--
200 East Wells	beta	$5 \times 10^{-8} \text{ to } 7 \times 10^{-1}$	--
200 West Wells	beta	$5 \times 10^{-8} \text{ to } 2.0 \times 10^{-2}$	--
Wells near 200 Areas	beta	$(0.5 \text{ to } 1.0) \times 10^{-7}$	--
Outlying Wells	beta	$(0.5 \text{ to } 2.0) \times 10^{-7}$	--
107 and 108 Wells	beta	$(0.0005 \text{ to } 3.1) \times 10^{-4}$	-2
Columbia River - Hanford Ferry	beta	1.2×10^{-5}	+2
Columbia River - Below Reactors	beta	7.4×10^{-6}	--
Columbia River - Paterson to McNary	beta	2.2×10^{-7}	--
Columbia River - Shore Mud	beta	$(0.15 \text{ to } 3.4) \times 10^{-4} \mu\text{c}/\text{gm}$	+6
Raw Water - Operating Areas	beta	$(0.05 \text{ to } 6.2) \times 10^{-6}$	--
Reactor Effluent Retention Basins to River	beta	$5,700 \text{ to } 32,000 \mu\text{c}/\text{sec}/\text{reactor}$	--
Reactor Effluent Retention Basins to River	alpha	$(1.9 \text{ to } 7.4) \times 10^{-3}$	--
I-131 in Farm Waste to River	I-131	$0.04 \mu\text{c}/\text{sec}/\text{reactor}$	--
I-131 in Columbia River - Hanford	I-131	5×10^{-9}	--
300 Area Pond Inlet	alpha	$9.6 \mu\text{c}/\text{day}$	--
		1.5×10^{-7}	--
		7.3×10^{-8}	--
		1.0×10^{-6}	-2

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Radiological Sciences Department

Sample Type and Location	Activity Type	Average Activity Density $\mu\text{c/ml}$	Trend* Factor
<u>Atmospheric Pollution</u>			
Gross Alpha Emitters	alpha	$(\leq 0.4 \text{ to } 2.7) \times 10^{-14}$	+3
Gross Dose Rate - Separations Areas	beta - gamma	0.8 to 2.9 mrad/day	-2
Gross Dose Rate - Residential Areas	beta - gamma	0.7 to 4.1 mrad/day	-2
Active Particles - Separations Areas	beta	$(3.2 \text{ to } 5.3) \times 10^{-13}$	--
I-131 Separations Areas	I-131	$(\leq 0.4 \text{ to } 1.3) \times 10^{-13}$	-6
I-131 Separations Stacks	I-131	0.08 curie/day	-3
Ruthenium - Separations Stacks	Ru103-106	≤ 0.01 curie/day	--
Active Particles - Wash., Idaho, Ore., Mont.	--	0.05 to 0.40 ptle/ m^3	+2
Active Particles - Project	--	0.01 to 0.41 ptle/ m^3	+3
<u>Vegetation</u>			
Environs of Separations Areas	iodine	$(\leq 0.3 \text{ to } 2.0) \times 10^{-5} \mu\text{c/gm}$	-3
Residential Areas	iodine	$(\leq 0.3 \text{ to } 1.5) \times 10^{-5} \mu\text{c/gm}$	-3
Eastern Washington and Oregon	iodine	$(\leq 0.3 \text{ to } 3.5) \times 10^{-4} \mu\text{c/gm}$	+2
Non-Volatile Beta Emitters Wash. and Ore.	beta	$(\leq 0.1 \text{ to } 4.3) \times 10^{-4} \mu\text{c/gm}$	-2
Alpha Emitters - Separations Areas	alpha	$(0.6 \text{ to } 2.1) \times 10^{-7} \mu\text{c/gm}$	+2

*The trend factor shows the n-fold increase (+) or decrease (-) from last month, where values of n less than 2 will not be noted.

1102305

FINANCIAL DEPARTMENT MONTHLY REPORT

August, 1956

Preparation for the HAPO reorganization which became effective September 1 was a major effort in the Financial Department during August. Insofar as possible, personnel were allowed to spend at least a part of their time becoming familiar with new job assignments, arrangements were made for the division of records where centralized responsibilities were to be reassigned to decentralized operations, and numerous other details were worked out. Among the segregations completed by the end of the month was that of the fixed property records and ledgers which was accomplished by the Property Accountability Unit to effect the establishment of separate plant accounting organizational components. Segregation of movable property records was expected to be completed by September 7.

Various data processing applications were revised by the Procedures and Computing Section in anticipation of the plant reorganization. In the field of new data processing systems, the first phase of the Property Accounting procedures was completed and the first production runs on a five-year weather study were completed. Also, a two-week training course on the new IBM 650 Magnetic Drum Data Processing Machine was given to ten analysts.

A physical inventory of the property located in the Kadlec Hospital was taken during the latter part of the month, preparatory to the transfer of the property to the Methodist organization. Non-durable items were to be inventoried as closely as possible to the turnover date of September 10.

The annual physical inventory of general supplies and lubricants in the custody of the Stores Sub-Section disclosed a net overage of \$30,647, due primarily to discrepancies in units of issue, calculation of unit prices, and clerical errors.

A physical inventory of essential materials in the custody of the Manufacturing Department revealed an overage of \$6,935, due principally to the method employed in valuing materials consumed. Book values appeared reasonable and no adjustment was made.

A total of 64 Property Disposal Requests were processed during the month of August, as well as 20 Appropriation Requests having a dollar value of \$93,785.

A significant action was initiated by the Commission toward the ultimate liquidation of thorium inventories. Previous information had indicated that there would be a protracted period of storage. While still in the preliminary stages, action by the AEC now appears adequate to insure liquidation within six months.

The "Summary of Disbursements" for July, transmitted to the Director of the Finance Division, AEC, showed net disbursements of \$6,669,494, summarized as follows:

Payrolls and payroll deductions disbursed	\$4 320 207
Materials (including orders placed on requirements contracts) and freight	1 953 535
Taxes and insurance	480 725
Employee benefits	143 868
Subcontracts and agreements	41 576
Advances for travel and living expense	65 442
Miscellaneous	<u>56 088</u>
Gross disbursements	7 061 441
Less: Cash receipts	<u>391 947</u>
Net disbursements	<u>\$6 669 494</u>

Detailed reports for the Financial Department appear on succeeding pages, as follows:

Summary of Cash Disbursements, Receipts and Advances	I - 3
Auditing Section	I a - 1
Budgets and Measurements Section	
Contract Cost Section	I b - 1 through I b - 3
General Accounting Section	I c - 1 through I c - 6
Personnel Accounting Section	I d - 1 through I d - 3
Procedures and Computing Section	I e - 1 through I e - 5
Property Accounting Section	I f - 1 through I f - 2
SS Accountability Section	I g - 1 through I g - 3
Personnel and Organization Statistics	I h - 1 through I h - 2

SUMMARY OF CASH DISBURSEMENTS,
RECEIPTS AND ADVANCES

A summary of cash disbursements and receipts (excluding advances by the Atomic Energy Commission of \$7,500,000 for August and \$6,900,000 for July) for the months of August and July, 1956, is shown below:

<u>Disbursements</u>	<u>August</u>	<u>July</u>
Payrolls (net)	\$3 734 753	\$3 165 589
Materials and Freight	1 824 031	1 625 782
Payroll Taxes	729 740	1 184 901
Payments to Subcontractors	642 284	369 330
United States Savings Bonds	339 056	149 800
Group Insurance Premium	233 024	232 549
Travel Advances to Employees	61 214	65 442
Pension Plan--Employees' Portion	46 899	44 181
All Other	<u>178 414</u>	<u>223 868</u>
Total	<u>7 789 415</u>	<u>7 061 442</u>

<u>Receipts</u>		
Rent	109 229	110 147
Sales to AEC Cost-Type Contractors	77 953	52 924
Telephone	56 114	55 107
Electricity	53 981	58 345
Hospital	49 922	51 932
Sundry Accounts Receivable	36 722	19 139
Refund of Travel Advances to Employees	11 219	12 870
Bus Fares	8 507	8 407
Refunds from Vendors	6 245	3 846
Other	<u>8 430</u>	<u>19 231</u>
Total	<u>418 322</u>	<u>391 948</u>

Net Disbursements	<u>\$7 371 093</u>	<u>\$6 669 494</u>

Outstanding advances as of August 31 and July 31, 1956, were as follows:

	<u>August</u>	<u>July</u>
Cash in Bank--Contract Accounts	\$2 245 812	\$2 116 905
Cash in Bank--Salary Accounts	<u>20 000</u>	<u>20 000</u>
Total	<u>\$2 265 812</u>	<u>\$2 136 905</u>

AUDITING SECTION

August 1956

Reports were issued for the following audits:

- General Electric Insurance Plan
- Construction Costs
- General Electric Suggestion Plan
- Community Council Fund
- General Accounts
- Excess Sales
- Medical Aid, Industrial Insurance and Pension Awards

Follow-ups were made to determine the extent of compliance with recommendations in reports of the following audits:

- Plant Libraries
- Classified Files
- Travel, Living and Entertaining Expenses

Two employee information meetings were held during the month.

BUDGETS AND MEASUREMENTS SECTION
AND CONTRACT COST SECTION
MONTHLY REPORT - AUGUST 1956

Employee and Public Relations Cost

The Community Landlord Report for FY 1956 was completed and issued during the month.

Costs incurred by the Community Section during the month of July were recast to the new code system which becomes effective at the time of reorganization.

In the Plant Activities Cost Sub-Unit all costs were being accumulated for recasting on new cost forms in anticipation of the new account classifications; also, as part of the preparation for reorganization. Other preparations included changing cost codes on store tickets, purchase requisitions, and other source documents.

Activity in Health and Safety Cost has centered around the preparation for the turnover of Kadlec Hospital to the Methodists on September 9 and also in anticipation of reorganization. Financial arrangements with respect to the turnover are being carefully watched and discussed with appropriate AEC Financial people.

Engineering Cost Unit

On August 16, 1956, the Company received approval and relief of accountability from the Commission for transfer to J. A. Jones Construction Company of the Minor Construction Major Equipment, Shop Equipment, Small Tools and Fixtures, Protective Clothing, Survey Instruments, and Construction Stores inventories.

At month-end over/under liquidations of cost for Reproduction, Drafting, Design Engineering, Estimating, Field Surveys and Project Engineering were distributed to projects active as of August 31, 1956, on the basis of charges applied during FY 1956.

In August a meeting was held on-site with representatives of UCRL and HAPO in attendance to discuss financial and operating matters pertaining to Whitney Project for the current fiscal year. The main financial topics discussed were HAPO liaison with UCRL, monthly cost billings, and provisions contained in purchase orders relative to operating and capital equipment expenditures. A purchase order has been received from UCRL to cover the first \$90,000 of the planned \$280,000 expenditure for capital equipment at HAPO during FY 1957.

The status of obligated funds included in the Prime Contract for active projects included in the Plant Acquisition and Construction budget for FY 1956 and prior fiscal years is reflected in the following schedule. The cost at July 31, 1956, represents the General Electric portion of total project expenditures at this date.

Engineering Cost Unit (continued)

(amounts in thousands)	<u>9200 Program</u>		<u>9700 Program</u>	
	<u>FY 1955 & Prior Yrs.</u>	<u>FY 1956</u>	<u>FY 1955 & Prior Yrs.</u>	<u>FY 1956</u>
Funds Obligated	\$69 000	\$10 043	\$213	\$201
Less:				
Cost at 7-31-56	<u>47 197</u>	<u>3 003</u>	<u>208</u>	<u>114</u>
Unexpended Obligations	<u>\$21 803</u>	<u>\$ 7 040</u>	<u>\$ 5</u>	<u>\$ 87</u>

In a letter dated June 26, 1956, the Company offered comments with respect to action taken by HOO-AEC on certain items in the FY 1958 Plant Acquisition and Construction Budget. On August 14, 1956, the Commission submitted the following information as support to the action that had been taken:

223-58(5) Second Remote Mechanical Production Line

B-5809 Based on the most recent weapons program assumptions, the production requirements for the 234-5 Building will not support the justification for facilities in addition to those to be provided by the \$1,500,000 currently in the HOO-AEC FY 1958 Budget.

B-58135 Utilities Additions - 300 Area

A review by HOO-AEC Engineering and Supply Division indicates that future utility additions in the 300 Area are not required until at least one year later than indicated in the data sheet. The requirements at that time would have to be studied in relation to the actions taken with regard to the location of any approved projects included in the FY 1958 request. If work is required before that date, limited amounts of General Plant Projects money could be made available.

B-58137 Improvements to Richland Public Library

A bill authorizing improvements to the Richland Public Library has recently been signed by the President. It is not known at this time whether funds in addition to the original \$2,165,000 made available from Item 723-D-57(1), "Municipal Facilities Richland Disposal", have been appropriated; however, since the work has been authorized, money can be made available from the above-mentioned budget item to cover the library project.

Documents containing FY 1957 Congressional Data Sheets were routed to the Department Managers and to interested Financial representatives. The funds covered by these data sheets, including General Plant Projects - FY 1957, total \$27,900,000 for the 9200 - Special Nuclear Materials Program and \$220,000 for the 9700 Community Program with no change to the latest estimate to Congress as submitted in the Budget for FY 1958 and Revision of the Budget for FY 1957 - Plant Acquisition and Construction.

The task of recasting the Research and Development Budget for FY 1957 and the costs incurred during July and August to conform with the new organizational and functional structure of the various Departments and Operations of HAPO has been an extremely difficult program. Successful accomplishment of this activity is anticipated at approximately mid-September.

General and Consolidations Cost Unit

The activities of the Unit for the month of August were geared mainly toward reorganization. All employees of the Unit spent considerable time familiarizing themselves with their duties under the new organization.

Procedures and Computing converted to a "functional standard" type of billing in the month of July, but arrangements were not completely programmed until after the Trial-Balance date in August. As a consequence of this, we were obliged to close August omitting all billings other than those on routine standards.

The above condition resulted in an underliquidity of \$50,000 in August. Upon completion of programming in late August, Procedures and Computing forwarded a billing tabulation which removed the July underliquidity. It is anticipated that very little over/under absorbed costs will remain at the end of August.

Conversion charges from Procedures and Computing for the conversion of the cost portion of IBM procedures amounted to \$5,400. These charges will be redistributed on a pro rata basis between the new departments.

Manufacturing Cost Unit

Listed below are some of the items which required considerable effort by Manufacturing Cost personnel in line with reorganization:

- A complete review of code structure was made.

- Capital work orders were code changed in line with the new code structure.

- The work order procedure was reviewed and brought up to date.

- Cost ledger and general ledger accounts were reviewed in preparation for decentralization.

- Training programs were started for personnel of each department for product cost accounting work and Equipment and Construction Work-in-Progress ledgers.

- Cost data was furnished to Measurements personnel of each department in connection with profitability studies.

- Financial Representatives prepared departmental budget estimates.

- The AEC Product Cost Report procedure was revised in line with decentralization.

Other Activities

The Financial Representative for Reactor Section continued to hold meetings with first-line supervision to discuss our competitive position with Savannah River. These meetings were held for the purpose of stimulating activity in reducing HAPO unit costs.

Calculations were made for a report on "Measurement of Returns from HAPO Research and Development Programs" for Engineering Department personnel. This report covers a five-year period from 1950-55 and indicates savings in operating and construction costs as a result of HAPO Research and Development programs as well as improved operating experience.

Assistance was given to AEC Financial personnel in making a comparison of HAPO and Savannah River Unit Costs for FY 1956.

Production and unit cost information was prepared and furnished each department in connection with the coming business review.

GENERAL ACCOUNTING SECTION

AUGUST 1956

ACCOUNTS PAYABLE UNIT

Volume of invoices processed in Accounts Payable during August returned to a normal level with 4,625 vouchers amounting to \$3,546,678 being processed during the month as compared to 3,403 totaling \$3,478,323 in July.

Purchase Orders received numbered 2,805 and amounted to \$1,936,689 as compared to the relatively light volume in July of 1,952 totaling \$1,485,744.

Cash discount earned during the month amounted to \$7,240, with a calendar year to date total of \$66,690.

Active contracts handled by Accounts Payable, excluding requirements contracts numbered 48 and contract commitments at month end amounted to \$404,585. Payments on these contracts during August totaled \$120,256.

Five new contracts were received in Accounts Payable during August as follows:

DDR-6	Allegheny Ludlum Steel Corporation Zircaloy tubes	\$77 505
MRO-4	Charles Bruning Company, Inc. Servicing reproduction equipment	362
MRO-5	Abadan-Spokane Servicing reproduction equipment	440
SA-13	McCray Marine Construction Company Diving services	10 000
CA-145	George W. Watt Research, development and plant technology services	7 500

Requirements contract orders placed during August numbered 16 in the amount of \$461,873. Total commitments on these contracts at month-end amounted to \$1,838,627, including demand charges under new contracts No. RO-32 and 33, with General Chemical for nitric acid and aluminum nitrate nonahydrate. Payments under requirements contracts totaled \$496,629.

Accounts Payable statistics for the months of July and August are shown on the following page.

ACCOUNTS PAYABLE UNIT, Continued

<u>Accounts Payable</u>	<u>August</u>	<u>July</u>
Balance beginning of month	\$ 687 086	\$ 986 307
Vouchers entered	3 546 678	3 478 323
Cash receipts	6 245	3 846
	<u>\$4 240 009</u>	<u>\$4 468 476</u>
Less: Vouchers paid	3 715 607	3 746 053
Debit vouchers transferred to Accounts Receivable	<u>-0-</u>	<u>35 337</u>
Balance end of month	<u>\$ 524 402</u>	<u>\$ 687 086</u>
Number of vouchers recorded	4 625	3 403
Number of checks issued	2 717	2 513
Number of freight bills paid	1 603	955
Amount of freight bills paid	\$ 295 580	\$ 174 916
Number of purchase orders received	2 805	1 952
Amount of purchase orders received	\$1 936 689	\$1 485 744
Amount of cash discount earned	\$ 7 240	\$ 4 656

ACCOUNTS RECEIVABLE UNIT

The gross accounts receivable balance at August 31, 1956 amounted to \$267,129, a decrease of \$48,797 from the balance of \$315,926 at July 31, 1956. This reduction results primarily from decreases in Sundry and AEC Cost-Type Contractor accounts amounting to \$14,369 and \$38,085, respectively, offset in part by minor increases in electricity, rental and safety shoe accounts.

On August 10, 1956, a reconciliation was made with our collection agencies, the Credit Bureau of Benton and Franklin Counties and the Columbia Valley Credit Exchange, to verify the number and amounts of accounts placed with them for collection. Only minor discrepancies were found, and the necessary corrective action was taken.

Delinquent notices were mailed to 164 telephone subscribers during the month, and the service of 12 subscribers was suspended due to nonpayment of bills. During the month 226 delinquent notices and 100 final notices were mailed to electricity customers. The service of eight electricity customers was suspended due to nonpayment of bills. The names of 33 tenants occupying Government housing were furnished the Commercial and Residential Property Unit, Community Section, for service of eviction notices due to nonpayment of rentals. All accounts have since been paid and it was not necessary to refer any to the United States Attorney for eviction action.

Accounts Receivable statistics are summarized on the following page:

ACCOUNTS RECEIVABLE UNIT, Continued

<u>Account</u>	<u>Balance 7-31-56</u>	<u>Net Charges</u>	<u>Collec- tions</u>	<u>Balance 8-31-56</u>	<u>Active Accounts</u>
Kadlec Hospital:					
Active	\$ 78 620	\$ 56 158	\$ 55 841	\$ 78 937	1 674
Collection Agencies (68 accounts)	5 857	-0-	104	5 753	
Rents	37 306	378 420	375 388	40 338	6 594
AEC Cost-Type Contractors	78 198	39 868	77 953	40 113	28
Electricity	27 684	56 930	55 794	28 820	3 955
Telephone	29 220	56 884	57 622	28 482	6 921
Sundry:					
Active	34 073	22 488	35 320	21 241	302
Collection Agencies (96 accounts - a)	6 085	75	1 612	4 548	
Equipment Sales to Facilities	16 752	-0-	349	16 403	1
Safety Shoes	1 071	2 650	2 267	1 454	246
Loans to Employees (5 accounts)	1 060	-0-	20	1 040	5
	<u>\$315 926</u>	<u>\$613 473</u>	<u>\$662 270</u>	<u>\$267 129</u>	<u>19 726</u>
Reserve for Bad Debts	<u>(34 737)</u>			<u>(35 320)</u>	
General Ledger Balance	<u>\$281 189</u>			<u>\$231 809</u>	

(a - includes all utility and rental accounts.)

ADMINISTRATIVE PLANNING

A total of 11 new or revised Organization and Policy Guides were issued during August. Of these, five were Instruction or Policy Guides; six were Organization Guides. The five Instructions are:

04.11	Control of Materials and Supplies
13.9	General Electric Employee Purchase Plan
13.12	Suggestion Plan
18.14.3	Procurement of New Employees
21.5	Processing of Excess, Salvage and Scrap

A summary of Organization and Policy Guides issued during July was sent to all section and department managers.

A report was made summarizing AEC Transmittals received within HAPO during July, 1956.

Four sets of Instructions and 248 extra copies of OPGs were distributed.

1102315

CONTRACT REIMBURSEMENTS

he following approvals were received from the AEC in August:

<u>Approval No.</u>	<u>Subject</u>
36	Technical and consulting work or other required services to be performed by other components of General Electric in the FY 1957 under the "Assistance to Hanford" program (Article X, Section 2, of the Prime Contract).
39	Special provisions in connection with the transfer of a resident engineer to Arco, Idaho as liaison on HAPO experiments.
41	Retention of professor from Fordham University to conduct seminar at HAPO in advanced buying techniques.
43	Revisions to Salary Manual.
46	Transfer to J. A. Jones Construction Company of certain minor constructions functions and property.
47	Plutonium fuel cycle program.
51	Elimination of fidelity bond coverage for Washington State employees handling HAPO compensation claims.

A request for the AEC's concurrence in the allowability of expenses incidental to the interview and moving of M. V. Davis, an employee who had taken an educational leave of absence to obtain his Ph.D. degree, from Corvallis, Oregon to Richland, upon his re-employment, was declined on the basis that the restoration of service credits upon his return would entitle him to all of the rights and benefits pertinent to his prior services and he would not be entitled to travel or moving expenses. Since it is General Electric policy to make such payment in justifiable cases, a modification to Appendix B is being drawn which would provide for the reimbursement of such expense for employees who are re-employed for more responsible positions.

At the request of the AEC an order for fabrication of an X-ray photometer has been accepted from the University of California as work to be done under the provisions of Article II, paragraph 8(d) of the prime contract.

The "Summary of Disbursements" for July, transmitted to the Director of the Finance Division, AEC, on August 21, showed net disbursements of \$6,669,494, summarized as follows:

Payrolls and payroll deductions disbursed	\$4 320 207
Materials (including orders placed on requirements contracts) and freight	1 953 535
Taxes and insurance	480 725
Employee benefits	143 868
Subcontracts and agreements	41 576
Advances for travel and living expense	65 442
Miscellaneous	56 088
Gross disbursements	7 061 441
Less: Cash Receipts	391 947
Net disbursements	<u>\$6 669 494</u>

GENERAL BOOKS UNIT

Fiscal year 1957 budgets for charges against the fixed fee and the budget for attendance at meetings of professional and trade societies were established and approved by the General Manager in August. Charges incurred during August and July are to be redistributed to the applicable Department or Operation under reorganization at September 1.

Training and orientation of personnel to be assigned to the various General Accounting Operations under reorganization has occupied a considerable portion of work time during August. Employees assigned to perform similar functions in the new organizations as is being performed in General Books are being trained by General Books personnel. This includes training in General Ledger procedures, travel and living expense cash controls, and other functions which are the responsibility of General Books.

Planning has been completed and letters written regarding the splitting of certain functions in General Books to the new organizational components. This includes the breaking out of travel, establishing beginning balances in appropriate ledgers and accounts of the new organizations and other similar work.

The establishment of work procedures was started this month in connection with the auction sale of surplus materials and equipment to be held on September 24, 1956. Revision of forms to be used have been completed.

Travel and living and conference expense reports processed in August totaled 285, representing a gross expenditure of \$65,875.82.

Cash and travel and living expense statistics for the month of August, along with the previous month's figures are shown below:

Advances from AEC	<u>August</u>	<u>July</u>
Balance at beginning of month	\$2 136 905	\$1 906 399
Advances received from AEC	7 500 000	6 900 000
Other cash receipts	418 322	391 948
	<u>10 055 227</u>	<u>9 198 347</u>
Less disbursements	<u>7 789 415</u>	<u>7 061 442</u>
Balance at end of month	<u>\$2 265 812</u>	<u>\$2 136 905</u>
Advances requested for subsequent month	<u>\$6 400 000</u>	<u>\$7 500 000</u>

GENERAL BOOKS UNIT, Continued

	<u>August</u>	<u>July</u>
Travel and Living Expenses		
Travel Advances to employees		
Balance at beginning of month	\$ 62 499	\$32 176
Advanced to employees	<u>61 646</u>	<u>65 438</u>
	<u>124 145</u>	<u>97 614</u>
Less:		
Travel, living and conference expenses reported by employees	65 875	22 245
Cash refunded by employees	<u>11 219</u>	<u>12 870</u>
	<u>77 094</u>	<u>35 115</u>
Balance at end of month	<u>\$ 47 051</u>	<u>\$62 499</u>
Outstanding Travel Advances to Employees		
Current	\$ 26 123	\$24 528
Outstanding over 15 days	<u>20 928</u>	<u>37 971</u>
Total	<u>\$ 47 051</u>	<u>\$62 499</u>
Number of expense reports submitted by employees	285	133

1102318

PERSONNEL ACCOUNTING SECTION
MONTHLY REPORT - AUGUST, 1956

The cost-of-living increase which was effective July 30 was paid for the first time during August. The "adder" factor for all non-exempt employees except business graduates, technical graduates, and community firemen was increased from 18% to 19.18%. An increase in isolation pay was effective the same date for non-exempt employees and effective August 1 for exempt employees. The new isolation pay rates are \$8.96 per week and 38.95 per month.

Office Letter No. 220 concerning the Labor Day Holiday was issued on August 22, 1956, outlining the recommended procedure for delivering time cards, stating the days when the holiday should be observed by shift workers, and stating the routine which would be followed in the delivery of weekly salary checks.

The Annual Cost of Fringe Benefits Survey which is required by the AEC was completed and forwarded to the Commission.

An unusually large number of special requests for reports of payroll statistical data were received during the month. Wherever and whenever possible, assistance was given to the persons requesting the reports. The majority of the reports were for use in implementing decentralization.

Listings of exempt and non-exempt personnel who are being assigned to various organizations under the decentralized operation were prepared. Corrections were being made to these listings beyond the month-end in order to properly segregate and integrate personnel changes.

Considerable time was devoted to training employees who will be performing payroll duties under the decentralized organization. A very large volume of work was performed in segregating all of the various records into six component files.

PERSONNEL ACCOUNTING SECTION

August, 1956

STATISTICS

<u>Number of HAPO Employees</u>	<u>Total</u>	<u>Monthly Payroll</u>	<u>Weekly Payroll</u>
<u>Changes During Month</u>			
Employees on Payroll at Beginning of month	9 457	2 383	7 074
Additions and Transfers In	125	15	110
Removals and Transfers Out	(177)	(38)	(139)
Transfers From Weekly to Monthly Payroll		10	(10)
Transfers From Monthly to Weekly Payroll			
	<u>9 405</u>	<u>2 370</u>	<u>7 035</u>
<u>Overtime Payments During Month</u>	<u>AUGUST</u> <u>Amount</u>	<u>JULY</u> <u>Amount</u>	
Weekly Paid Employees	\$106 980-a)	\$ 86 842-b)	
Monthly Paid Employees	23 218	14 811	
Total	<u>\$130 198</u>	<u>\$101 653</u>	
<u>Gross Payroll Paid During Month</u>	<u>AUGUST</u>	<u>JULY</u>	
Engineering	\$ 920 255	\$ 796 109	
Manufacturing	3 524 989	2 563 679	
Other	1 586 930	1 182 491	
Total	\$6 032 174-c)	\$4 542 279-b)	

(a- Payments to weekly paid employees are for six week periods.

(b- Payments to weekly paid employees are for four week periods.

<u>Employee Benefit Plans</u>	<u>Number Participating</u>	<u>Percent Participation</u>	<u>Number Participating</u>	<u>Percent Participation</u>
<u>Participation in Benefit</u>	<u>August</u>	<u>July</u>	<u>August</u>	<u>July</u>
<u>Plans at Month End</u>				
Pension Plan	8 689	8 707	99.1%	99.0%
Insurance Plan				
Personal Coverage	9 440	9 487	99.6	99.6
Dependant Coverage	6 713	6 740		
U. S. Savings Bonds				
Stock Bonus Plan	5 025	5 149	53.4	54.4
Savings Plan	1 035	1 028	11.0	10.9
Both Plans	5 577	5 593	59.3	59.1

1102320

	<u>August</u>	<u>July</u>
<u>Pension Plan</u>		
Number retired	9	-
Number who became eligible for participation	88	77
Number who applied for participation	81	75
Number who elected not to participate	3	2
Replies not received	4	-
 <u>Insurance Plan - Number of Claim Payments</u>		
Employee life insurance	-	3
Employee accident and health insurance	474	453
Dependant accident and health insurance	<u>322</u>	<u>627</u>
Total	<u>796</u>	<u>1 083</u>
 <u>Good Neighbor Fund</u>		
Number participating	6 741	6 737
Percent participation	71.6%	71.2%
 <u>Suggestion Awards</u>		
Number of awards	182	30
Total amount of Awards	\$2 575	\$1 355
 <u>Preferential Rates</u>		
Number (eliminated) or added	2	(2)
Number currently in effect	469	467
 <u>Number of Military Allowance Payments</u>	4	2

PROCEDURES AND COMPUTING SECTION

AUGUST, 1956

GENERAL

Changes are presently being made to a number of routine cost programs, as a result of the plant reorganization in September. These programs include work order cost, store orders, salary distribution, vehicle operating cost, and office machines. The majority of the changes involve changes in cost codes. Revisions of the weekly and monthly payroll procedures are also being made.

The first phase of the conversion of the Property Accounting procedure to the 702 was completed during the month. Records of some 20,000 pieces of movable property were converted from punched cards to magnetic tape. Most of the report passes have been programmed and tested, and the initial reports will be prepared as soon as cost code information is made available.

The first production runs on the five-year weather study were completed in August. Weather tower data for 1954 and 1955, consisting of hourly recording temperature, humidity, and similar variables, were processed and summarized in tabular form. Data for 1951, 1952 and 1953 remain to be run, after which processing will be done on a monthly basis.

A group of ten analysts from the Data Processing Operation are participating in a two-week training course for the IBM 650, to be installed the first week in September. The 650 will be used primarily for scientific and engineering computations, and work is nearing completion on the development of a coding system for this purpose.

A three-day trip was made to Seattle to visit some of the data processing installations. The following equipment and installations were visited: Boeing Flight Center, Boeing Vibration Laboratory, Boeing EDPM (705), General Insurance Co., Tally Register Corporation; Burroughs El01 Computer, Benson-Lehner Data Plotter and Data Reader, Tally Data Plotter, Datatron Computer, IBM 705 EDPM and a special Sperry Rand data reduction system. These items are covered in detail in the trip report.

The humidity control portion of the refrigerated air conditioning system for the EDPM room was redesigned and rebuilt. The changed unit provides for more stable control and permits operation during periods of high outside humidity (formerly impossible).

NUMERICAL AND PROCEDURAL ANALYSIS

Work continued on the revision of the payroll procedures made necessary by the plant reorganization. All weekly payroll programs, including the weekly overtime report, were analyzed and the necessary changes incorporated; some four additional 702 passes are required as a result of the revision. Changes to the monthly payroll programs are presently being made. Steps were taken to provide for new distribution of payroll reports, as required by the new organization.

A routine to provide special reports for bond purchase was written in order to provide each new organization with correct bond balances. This information will also be used to establish new bond records at the Schenectady office. Similar steps are being taken to provide pension balances.

NUMERICAL AND PROCEDURAL ANALYSIS (continued)

Cards were prepared for the physical inventory of general supplies, medical caption, facilitate turnover of Kadlec hospital to a private group.

Training on the 884 tape-preparing typewriter was continued for stores personnel. The first tapes for the spare parts procedure will probably be produced in September. General procedures outlining 884 operation in conjunction with the general supplies inventory program were issued.

The first cycle and document inventories in the classified files program were run successfully during the month. A meeting was held with files personnel on August 22 to discuss the remaining phases of file conversion to the 702. Topics covered included termination inventories, listing of offsite and destroyed documents, and the preparation of statistics on files operation from existing programs.

Reorganization revisions have been made to four of the work order cost programs. Testing of the principal file maintenance and calculate pass is continuing. Changes of similar nature have been made to the billing and recording passes of the office machines procedure. Cost code changes will be made in the near future.

The conversion of property accounting procedures to the 702 is nearing completion. Virtually all uninstalled cataloged property records have been transcribed to magnetic tape. Future transactions affecting this type of property will be recorded on an 884 tape-preparing typewriter, and the tape will be used as input to the 702 system. This system will provide proof listings of input transactions, journal of accounting transactions, periodic revisions of the property catalog, custodian control cards and accountability lists, and listings of property by class and nomenclature. Initial listings will be produced as soon as form conversion tables for new custodian codes have been provided.

Preliminary study has been completed on the conversion of the film badge exposure records procedure to the 702. Representatives of the exposure records operation are participating in the definition of the system, and will assist in the logic flow charting, which will begin shortly. Arrangements have been made to have the data keypunched in the field. Key punch operators for this purpose are presently being trained at the data processing facility.

Programming of an integrated system for biological calculations is nearing completion. The system makes use of a standard data sheet and input card form for entering identifying information and radioactivity counts, and is designed to produce six separate reports. Data for August have been run to produce three of these reports. The remaining reports are presently being tested.

The first production runs on the five-year weather study were completed in August. Weather tower data for 1954 and 1955, consisting of hourly recording temperature, humidity, and similar variables, were processed and summarized in tabular form. Data for 1951, 1952 and 1953 remain to be run, after which processing will be done on a monthly basis.

A master file of detailed reactor tube discharge records has been created on the 702, and reports prepared as requested for the Operations Research Reactor Study. Work is continuing on subsequent 702 passes to prepare reports which will define thematical relationships between the various factors involved. Methods are being devised for updating all information in the master file in order to keep the file usable at all times.

1102323

NUMERICAL AND PROCEDURAL ANALYSIS (continued)

A new procedure for calculating and applying reactor tube boiling limits has been accepted. TBI calculations, therefore, are being completely reprogrammed to reflect these advances in reactor technology.

A report pass has been designed, in connection with the power and exposure study, for building distribution tables of reactor tube exposures vs. powers, factors or outlet water temperatures. The pass will handle multiple tape, random tube order input from which eight selected distribution tables may be made for each reactor. The tables, in turn, may be combined in any manner within or between reactors. The writing of 702 instructions to accomplish the pass will be started during the month of September.

Calculation of temperature distributions in a cylindrical fuel element was completed. The primary parameters considered were heat transmission and generation functions. Each choice of these parameters required the solution of a tenth-order system of simultaneous equations, which was used to evaluate a series in which the secondary parameters, radius and angle, appeared. In all, 24 combinations of the primary parameters and 280 combinations of the secondary parameters were treated.

The determination of critical mass dimensions has been undertaken. The calculation involves the iterative solution of a set of three equations for nine combinations of parameters. Programming has been completed.

The second phase of the Resonance Escape Probability calculation has been started. Input is a tape containing scattering and absorption cross-sections as a function of KT , and energy. Calculated values will include blackness, escape probability (both exact and approximate) and first flight escape probability. In addition, the exponents of the probability expressions will be summed over the energy spectrum.

In addition to special short report calculations which were completed during the month, the following production runs were made:

- (1) Theoretical Buckling calculation - two runs.
- (2) Multi-region P-3 Calculation - two 3-region runs, two 5-region runs.
- (3) Multi-interval Calculation - one run with modified cross-sections.
- (4) I & E Exposure Test at C Reactor - final reports completed.
- (5) Optimize outlet temperatures - final reports completed.
- (6) Design Temperature Calculation - five cases.
- (7) I and E Calculations - 83 cases for three customers.
- (8) I & E Economic Study - 8 cases.

FORMS CONTROL

Printing Orders Received in Forms Control

452

Items Ordered:

Miscellaneous Forms	920,315
IBM Card Forms	2,100,000
IBM Continuous Forms	330,000
Envelopes	9,000

Total Quantity

3,359,315

FORMS CONTROL (continued)

Rejections:

Printing Orders	26
Items	36,125
Orders Increased in Quantity	4
Orders Decreased in Quantity	1
Number of Forms Obsolete	22
Number of Forms Designed and Redesigned	87

RECORDS OPERATIONS

Quantity of records received, processed and stored:

Employee and Public Relations Department	46	Standard Storage Cartons
Engineering Department	136	" " "
Financial Department	261	" " "
Manufacturing Department	213	" " "
Radiological Sciences Department	50	" " "
	<u>706</u>	

Records Retention and Disposal Schedule Number 233, "Projects Justification, Authority and Administration Records" consisting of 19 individual records was developed and submitted for internal approval. Records Retention and Disposal Schedule Number 231, "Stores and Excess Operations Records", consisting of 11 individual records was submitted to the Atomic Energy Commission for approval.

COMPUTING OPERATIONS

The 650 Magnetic Drum Data Processing Machine has been installed and is currently undergoing acceptance tests by IBM Customer Engineers. The computer will be turned over to G. E. on September 11.

Preliminary development work for the 650 is nearing completion. The automatic programming system for the 650 (OMNICODE) has been programmed with 60-70% of it tested. OMNICODE will be used to prepare 650 programs on the 702. The complete library of floating-decimal arithmetic and mathematical subroutines has been written and testing will begin as soon as the 650 is available.

The first two-week training course for 650 was conducted. Personnel from Theoretical Physics, Design Analysis, Statistics, Exponential Physics, and Data Processing were in attendance. The first week of the course was devoted to the 650 itself - machine operation, control-panel wiring, optimum programming and console operation. During the second week 650 programs were written using OMNICODE. The next training course is scheduled for October 1.

Work has been completed on a weekly customer billing report. The report includes actual cost, billing cost, estimates, and line-by-line entries of all work done during the week. In addition, a report on machine utilization, including hourly rates for machines and labor, is issued. These weekly reports are routinely prepared, as well as a monthly report summarizing total cost, estimates or billing figures.

An attempt to relieve the work load on punched-card equipment, the preparation of the weekly Force Report, Union Report, Cost Code Report, and Area Location Report will be prepared on the 702.

COMPUTING OPERATIONS (continued)

In preparation for the reorganization, the Procedures and Computing Section had to revise operating procedures and 702 programs so that information would be available as needed. Many of the reports prepared for one organization must be prepared for six organizations in the future. Some require special processing based upon the organization code and/or the account class code that were being changed. Others had to be revised to present information in a different manner. Special reports were required to assist other organizations at Hanford in performing their part of the reorganization. The revision of the programs and procedures was coordinated with the requirements of the new organizations. Proposed changes were discussed with and approved by the affected organizations before they were incorporated in the operating instructions. The timing of the revisions was worked out so that the current operating schedules were affected as little as possible. These revisions have been made or will be made by the time they will be needed to process data during September for the new organization.

During the month of August, the following non-routine assignments were worked on for customers:

Employee and Public Relations	6
Engineering	30
Financial	35
Manufacturing	13
Operations Research	1
Radiological Sciences	8
	93

Service charges for the month amounted to \$85,576.32. Services by customer were as follows:

Employee and Public Relations	\$ 1 262.64	01%
Engineering	19 384.30	23
Financial	51 826.57	61
Manufacturing	5 009.93	06
Operations Research & Synthesis	2 701.84	03
Radiological Sciences	5 391.04	06
	\$85 576.32	100

PROPERTY ACCOUNTING SECTION

August, 1956

PROPERTY ACCOUNTABILITY UNIT

A physical inventory of durable property located in the Kadlec Hospital was taken during the latter part of the month preparatory to transfer to the Methodists. Non-durable items will be inventoried as near as possible to turnover date of September 10, 1956. Shipping documents and a copy of the deed will authorize transfer to the Methodists.

Posting of detail records through July 31, 1956 business was completed early in the month. Detail records were balanced to all subsidiary plant control ledgers at the close of July, 1956 business. Minor adjustments were made as required.

Major concentration of the unit during August was the segregation of detail records and ledgers to affect establishment of individual Plant Accounting operations in accordance with reorganization. All fixed property records and ledgers were segregated by the end of the month. Movable property records were partially segregated and will be completed by September 7, 1956.

Other documents, supporting detail records and information necessary for operation under separate groups was also segregated and forwarded to applicable personnel.

Methods of segregating records currently recorded on the 702 Machine were developed and agreement reached with Computing and Procedures personnel for mechanical segregation of those records.

Property Accountability personnel at the end of the month totaled 31, comprising 5 exempt and 26 non-exempt.

CAPITALIZATION AND DEPRECIATION UNIT

During the month of August all personnel of the Capitalization and Depreciation Unit were released to spend at least part of their time on their new job assignments. Information meetings were held from 7:00 - 8:30 AM each Tuesday and Thursday to discuss problem areas with exempt personnel who will have property accounting responsibilities after reorganization. A chart of accounts was established for each HAPO Department and Operation.

Project unitization reports of closed projects and detail of current projects were segregated and made available to the new Plant Accounting Operations. Project unitizations were maintained on a current basis during the month on a decentralized basis.

Various methods of booking inter-departmental transfers were examined to determine the most feasible method to be followed at HAPO in order to eliminate book profits and losses and to prevent writing up or down the true first cost of property. It was decided that property would be transferred at net book value and the various current accounts would be charged or credited with the undepreciated (net book) cost of the item being transferred.

CAPITALIZATION AND DEPRECIATION UNIT (Continued)

The recast of Plant Investment since acquisition for the Operating Departments has been completed and is now being photostated. When this information is reproduced, copies will be forwarded to the appropriate Managers - Finance.

INVENTORY ACCOUNTING UNIT

Final results of the physical inventory of general supplies (excluding automotive and heavy equipment parts) and lubricants in the custody of the Purchasing and Stores Section disclosed a net overage of \$30,647. The difference between physical inventory value and reconciled value compared to disbursements amounted to 1.36%. The overage was attributed principally to discrepancies in units of issue, calculation of unit prices and posting errors.

Final results of the physical inventory of essential materials (excluding coal and fuel oil) in the custody of the Manufacturing Department disclosed a difference of physical inventory value over reconciled book value of \$6,935. Inventory values were also calculated using the first in - first out method and disclosed a net difference between two methods of only \$82. Book value of material inventoried amounted to \$2,085,483.

Final results of Road Materials in the custody of the Transportation and Community Sections disclosed an overage of \$4,331. This overage is believed to be the result of the relative inaccuracies in measuring the receipts & disbursements of this material and the inaccuracies of the methods used in measuring the storage piles.

The reconciliation, and report was completed for general supplies (excluding road and railroad track materials) in the custody of the Transportation Section. Final results disclosed a net overage of \$311.

The overage compared to disbursements amounted to 0.8% and was principally attributed to undocumented returns to stock and disbursements of material other than that indicated on store order.

Preliminary preparations were made for conducting the physical inventory of medical, food and pharmaceutical supplies to be transferred to the Methodist Board of Trustees. Inventory of the above material is being made in connection with the transfer of Kadlec Hospital to the Methodist Board of Trustees effective midnight September 9, 1956.

A review of the peg board ledger system was conducted to determine the possibility of replacing our present ledgers. By recasting the month of July it became apparent that the new system has definite advantages.

Preparations were made to train new personnel, revise the monthly reports, and segregate the accounts for the reorganization.

PROPERTY MANAGEMENT UNIT

A total of sixty-four (64) Property Disposal Requests were processed during the month of August.

A total of twenty (20) Appropriation Requests having a dollar value of \$93,785 were processed during the month of August.

SS ACCOUNTABILITY SECTION
MONTHLY REPORT - AUGUST, 1956

SUMMARY

A. E. C. action directed towards the ultimate liquidation of thorium inventories constitutes the most significant change in status. Previous information had indicated a protracted period of storage while still in the preliminary stages action by the A. E. C. now appears adequate to insure liquidation within six months.

UNIT ACTIVITIES:

Metal Preparation Area - SS Accountability Unit

New Type Cored Slugs

We are currently receiving new type cored slugs. For purposes of reporting an average factor weight per slug has been established. This factor is on a temporary status and will be reviewed after the accumulation of additional data.

I & E Slugs

Initial receipts of production type I & E Slugs were made during the month. Due to slug weight variances no factor has as yet been established. In addition, measurement problems involving pickling, canning and recovery loss factors require resolution.

Receipt Controls

Our Receiving procedures disclosed an unidentified box which upon investigation was shown to have been Shipper's error. Material has been returned to NLO.

Thorium Liquidation

Opening inquiries as to our thorium inventories served notice that the A. E. C. is taking action on the liquidation of thorium. Off-site transfer of this material would eliminate one of the largest inactive status items currently booked. We have complied with A. E. C. requests to their satisfaction and are now waiting on shipping instructions.

Reactor Area - SS Accountability Unit

One of the principal items of interest has been the reduction of Technology holdings. This reduction was to be effected by the return of old pieces to the production stream and the increase in turnover of pieces taken into Technology inventory. A summary of results for August shows that a total of 5,387 pieces were returned to the production stream in August, leaving an inventory of about 2,200 pieces at month-end. This, contrasted to the transfer of only 154 pieces to Technology during the month, is a fair indication that the expected results have been obtained. Previously, it was anticipated that a 50 per cent reduction from a high of about 8,000 pieces was desirable.

Separations, Accounting & Measurement Units - SS Accountability Unit

I-Plant

We are continuing to recover minor quantities of plutonium from the concentration (224-T) process equipment but anticipate economic factors to place limits on continued action. T Plant experience has duplicated B Plant in that recovery has been sizeable but slow shows a reduction in flush yield but never approaches zero.

Redox

On low MWD program. As a result Am/Cm correction applied to analytical results by standardized procedure. In addition, controls have been improved by current revisions to the weight relations charts.

Purex

On high MWD program. Measurement difficulties were encountered in the dissolver solution tank E-5 and UNH measuring tank K-6 both of which give indications of bias. Tank calibrations are being reviewed as the most likely source of difficulty.

TBP-UO₃

Construction of continuous calciner is now in progress with the first shipments scheduled for September. As the result of review tighter controls have been placed on UO₃-U-235 analysis. Other measurement problems investigated included the transfers of UNH together with procedures for control of transfers from UO₃ to Purex at the time routine use of recovered HNO₃ returns to the 241 blending tanks cease.

An audit review of TBP-UC₃-241 WR was completed and documented in August. Satisfactory controls were indicated together with recommendations for further improvements which are now in the process of application.

Calibration of the new Toledo scales to be used in bulk - UO₃ shipments has been under investigation. This procedure has included expert review by Manufacturer's representative.

Recuplex

Continued recovery of fragments and powders with low yields. Throughput continues to barely match rate of generation with the result early liquidation of accumulated backlog does not appear feasible.

Isolation

Small throughput with major transfers being made to Task I.

Shipper-Receiver Variance problems continue with review at this site confirming original shipping quantities.

RMA Line

Heavy throughput due to combined local and SR production. The continued observation of the standard accounting system recently installed gives further indication of its satisfactory performance.

General

The Section continues to maintain a low absenteeism rate as evidenced by reports based on 1 per hundred employees.

General - Continued

Unrecoverable Material Records have been established for the 200 Area in compliance with USAEC requirements.

Two Suggestion Awards were made during the month and a third is now under review. This continues the Sections leadership within the Financial Department.

A major problem involving personnel limitations exists with respect to the editing and final draft of the Redox Manual for which all basic data is now available. Reassignment of personnel appears to be the only solution. Cost of reproduction appears to be an additional factor.

FINANCIAL DEPARTMENT PERSONNEL AND ORGANIZATION

AUGUST, 1956

	<u>Current Month</u>	<u>Prior Month</u>
<u>Personnel Changes During Month</u>		
Employees at beginning of month	512	510
Additions and transfers in	12	12
Removals and transfers out	(13)	(10)
Employees at end of month	<u>511</u>	<u>512</u>
<u>Personnel by Unit at Month-End</u>		
<u>General</u>	<u>12</u>	<u>12</u>
<u>Auditing Section</u>	<u>17</u>	<u>17</u>
<u>Budgets and Measurements Section</u>	<u>13</u>	<u>13</u>
<u>Contract Cost Section</u>		
General and Consolidations Cost Unit	11	11
Engineering Cost Unit		
General	3	3
Design Cost	9	9
Project Cost	21	21
Technical Cost	11	12
Employee and Public Relations Cost Unit		
General	2	2
Plant Activities Cost	10	10
Community Cost	5	5
Medical Cost	3	3
Manufacturing Cost		
General	2	2
Financial Representatives	13	13
Budgets and Control	18	18
Reports and Records	16	16
Analysis and Studies	<u>3</u>	<u>3</u>
	<u>127</u>	<u>128</u>
<u>General Accounting Section</u>		
Accounts Payable Unit	24	25
Accounts Receivable Unit	20	21
General Books Unit	17	17
Administrative Planning	3	3
Contract Reimbursements	<u>5</u>	<u>5</u>
	<u>69</u>	<u>71</u>

	<u>Current Month</u>	<u>Prior Month</u>
<u>Personnel Accounting Section</u>		
Payroll Planning and Analysis Unit	7	7
Weekly Payroll Unit	17	17
Monthly Payroll Unit	11	13
Benefit Plans Accounting Unit	13	13
Payroll Reports Unit	9	8
Weekly Payroll Records Unit	7	7
	<u>64</u>	<u>65</u>
<u>Procedures and Computing Section</u>		
Computing Operations Unit	17	21
Numerical Analysis Unit	18	12
Procedural Analysis Unit	15	15
Scheduling Unit	22	22
Records Unit	8	8
	<u>80</u>	<u>78</u>
<u>Property Accounting Section</u>		
Appropriations Unit	5	5
Inventory Accounting Unit	12	12
Property Accountability Unit	31	30
Property Management Unit	4	4
Capitalization and Depreciation Unit	20	20
	<u>72</u>	<u>71</u>
<u>SS Accountability Section</u>		
Reactor Area - SS Accountability Unit	6	5
Separations Area - SS Accountability Unit	18	18
Metal Preparation Area - SS Accountability Unit	7	8
SS Accounting Unit	6	6
SS Measurements Unit	9	8
	<u>46</u>	<u>45</u>
<u>Rotational Trainees</u>	<u>11</u>	<u>12</u>
	<u>511</u>	<u>512</u>

OPERATIONS RESEARCH AND SYNTHESIS SECTION

August, 1956

The following is the month end summary of personnel:

	<u>As of 7-31-56</u>			<u>As of 8-31-56</u>			<u>Net Change</u>		
	<u>Ex</u>	<u>Non-Ex</u>	<u>Total</u>	<u>Ex</u>	<u>Non-Ex</u>	<u>Total</u>	<u>Ex</u>	<u>Non-Ex</u>	<u>Total</u>
General	1	1	2	1	1	2	0	0	0
Oper. Research Analysts	4	0	4	2	0	2	-2	0	-2
Total	5	1	6	3	1	4	-2	0	-2

L. W. Smith terminated effective August 3 to accept a position with Ramo-Wool-dridge Corporation in Los Angeles. R. C. Burke terminated August 17 to accept a position as instructor at the Agricultural and Mechanical College of Texas. He plans to continue his education while teaching.

R. Y. Dean spent August 20-23 in Seattle, attending the joint national meetings of the American Mathematical Society, American Mathematical Association of America and Institute of Mathematical Statistics. P. M. Thompson presented a paper at a special conference on linear programming held by the RAND Corporation in Los Angeles on August 30 and 31.

* * *

Plans have been made for a member of the Operations Research and Synthesis Section to spend three or four months, starting in September, assisting the Irradiation Processing Department in developing an appropriate reactor data processing system.

The problems of the appropriate balance between goal exposure and the power under the conditions imposed by revised material allocations were discussed with the Production Section.

Following a study of the preliminary results available from the machine processing of slug rupture data, some revisions in the processing have been completed. A complete listing of historical data is expected early in September.

A resume of our development work on quadratic programming was furnished to the General Engineering Laboratory in Schenectady. Arrangements are also being made to furnish Commonwealth Edison with the assembly and restart routines associated with our 702 program of the simplex algorithm for the solution of linear programming problems.

A resume of the present status of the Transportation Report was prepared.

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