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HANFORD

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MONTHLY REPORT

HANFORD ATOMIC PRODUCTS OPERATION

FOR

AUGUST 1955

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By Authority of

DS. Spence 4-23-92
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Compiled By
DEPARTMENT MANAGERS

September 27, 1955

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TABLE OF CONTENTS

General Summary	A-1
Staff	B-1
Number of Employees	C-1
Personnel Distribution	D-1
<u>Manufacturing Department</u>	E-1 through E-5
Monthly Operating Report	Ea-1 through Ea-8
Metal Preparation Section	Eb-1 through Eb-7
Reactor Section	Ec-1 through Ec-14
Separations Section	Ed-1 through Ed-15
Electrical Utilities Section	Ee-1 through Ee-6
Purchasing and Stores Section	Ef-1 through Ef-5
Transportation Section	Eg-1 through Eg-5
<u>Engineering Department</u>	F-1 through F-4
Engineering Administration	Fa-1 and Fa-2
Pile Technology	Fb-1 through Fb-64
Separations Technology	Fc-3 through Fc-49
Design	Ff-2 through Ff-13
Project	Fg-2 through Fg-16
Advance Engineering	Fh-1
<u>Employee and Public Relations Department</u>	G-1 through G-4
Personnel Practices	Ga-1 through Ga-10
Employee Communications and Public Relations	Gb-1 through Gb-11
Union Relations	Gc-1 through Gc-3
Salary Administration	Gd-1 and Gd-2
Education and Training	Ge-1 through Ge-10
Health and Safety	Gf-1 through Gf-13
<u>Community Section</u>	Gg-1 and Gg-2
Maintenance Renovation Unit	Gga-1 through Gga-6
Police Unit	Ggb-1 through Ggb-8
Commercial and Residential Property Unit	Ggc-1 through Ggc-8
Fire Unit	Ggd-1 and Ggd-2
<u>Community Operations Sub-Section</u>	
Electrical Unit	Ggf-1 through Ggf-5
Engineering Unit	Ggg-1 through Ggg-4
Public Works and Recreation Unit	Ggh-1 through Ggh-4
Water and Dewaterage Utilities Unit	Ggi-1 and Ggi-2
Richland Public Library	Ggj-1
Auxiliary Operations and Plant Protection Section	Gh-1 through Gh-26
<u>Radiological Sciences Department</u>	H-1 through H-7
<u>Financial Department</u>	I-1 through I-34
Procedures and Computing Section	Ia-1 through Ia-5
<u>Operations Research Study</u>	J-1 and J-2

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HW 38820 DEL

MONTHLY REPORT
HANFORD ATOMIC PRODUCTS OPERATION

AUGUST 1955

GENERAL SUMMARY

PRODUCTION OPERATION

The inventory of acceptable canned slugs was reduced to less than a one week supply because of heavy reactor discharges and low production yields. The bare slug inventory was maintained at approximately 1-1/2 weeks supply.

Starting August 18, after completion of minor repairs to the Redox plant, the 1S and 1A columns were operated in parallel. By August 25, a production rate of 11 tons per day had been achieved, and this rate was continued for the balance of the month.

ENGINEERING TECHNOLOGY

Total design for Project CG-558, Reactor Plant Modification for Increased Production, advanced to 91% complete.

A relationship was observed between absolute humidity at FMPC, hydroxyl content of the heat treating bath, hydrogen content of the heat treated uranium, and porosity (and/or void) rejects of lead-dip canned slugs. Further analysis indicates that, if the hydroxyl content of the heat treating bath is kept below one percent, the rejects for braze porosity should be less than two percent.

Based on poor decontamination in the scrub sections of the HA and 1A columns, in the Purex Plant, the recommendation was made that their lengths be increased by at least 7 feet and that anti-backmixing caps be installed just above the feed point. Recent cold and hot semi-works studies are confirming the need for such a plant change. Specifications for lengthening the Purex column scrub sections were provided.

PERSONNEL & SERVICES

The first fatality in Operations activities occurred August 31, 1955, as a result of an explosion in the 300 Area.

In view of recent Congressional action with respect to expenditures for construction projects, the General Electric Company now has a responsibility as a prime contractor to continually review the status and availability of funds for projects on which it performs management or architect-engineer-management services.

Temperature changes in the Columbia River have been found to be more responsive to solar heat on the McNary impoundment than to Hanford effluents.

A-1

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STAFF

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 Study B. F. Butler

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HANFORD ATOMIC PRODUCTS OPERATION
NUMBER OF EMPLOYEES
AUGUST 31, 1955

<u>DEPARTMENT</u>	<u>EXEMPT</u>		<u>OTHER</u>		<u>TOTAL</u>	
	<u>8-31-55</u>	<u>7-31-55</u>	<u>8-31-55</u>	<u>7-31-55</u>	<u>8-31-55</u>	<u>7-31-55</u>
<u>Counsel</u>	2	3	2	2	4	5
<u>Operations Research Study</u>	6	6	1	1	7	7
<u>Employee & Public Relations Department</u>						
General	8	9	8	8	16	17
Salary & Wage Administration	11	11	10	11	21	22
Personnel Practices	17	15	41	41	58	56
Education & Training	6	6	71	69	77	75
Emp. Comm. & Pub. Rel.	11	11	40	38	51	49
Union Relations	5	5	1	1	6	6
Aux. Oper. & Plant Prot.	115	115	800	816	915	931
Community	77	79	330	332	407	411
Health & Safety	47	49	171	172	218	221
<u>Engineering Department</u>						
Engineering Administration	29	31	88	82	117	113
Advance Engineering	8	8	1	1	9	9
Design	170	179	119	120	289	299
Project	179	176	171	171	350	347
Pile Technology	238	243	162	153	400	396
Separations Technology	171	173	94	95	265	268
<u>Manufacturing Department</u>						
General	21	21	9	9	30	30
Reactor	321	319	1 396	1 384	1 717	1 703
Separations	306	305	1 601	1 606	1 907	1 911
Metal Preparation	105	108	567	567	672	675
Transportation	44	44	443	446	487	490
Purchasing & Stores	61	61	225	220	286	281
Electrical Utility	16	16	73	74	89	90
<u>Financial Department</u>						
General	9	9	9	10	18	19
Budgets & Measurements	7	7	5	4	12	11
Contract Cost	23	24	101	101	124	125
General Accounting	9	9	61	58	70	67
Property Accounting	16	16	52	47	68	63
Auditing	14	14	2	2	16	16
SS Accountability	10	10	36	34	46	44
Personnel Accounting	9	9	54	53	63	62
Procedures & Computing	29	30	52	51	81	81
<u>Radiological Sciences Department</u>						
General	5	6	-	-	5	6
Records & Standards	30	31	171	170	201	201
Biophysics	55	53	72	70	127	123
Biology	32	31	42	43	74	74
Engineering	6	6	1	1	7	7
Adm. & Comm.	2	2	5	5	7	7
GRAND TOTAL	<u>2 230</u>	<u>2 250</u>	<u>7 087</u>	<u>7 068</u>	<u>9 317</u>	<u>9 318</u>

AREA PERSONNEL DISTRIBUTION

AUGUST, 1955

		100-B 100-D 100-F 100-H 100-K 200-E 200-W 300				700-1100		Other Areas*	Total	
		Area	Area	Area	Area	Area	Area			Plant General
<u>ENGINEERING DEPARTMENT</u>										
Exempt	23	51	-	5	35	53	63	269	795	
Other	11	27	2	89	18	21	33	220	635	
Total	34	78	2	94	53	74	96	489	1 430	
<u>MANUFACTURING DEPARTMENT</u>										
Exempt	67	56	78	66	53	92	231	106	874	
Other	275	305	314	266	247	400	1 248	564	4 314	
Total	342	361	392	332	300	492	1 479	670	5 188	
<u>FINANCIAL DEPARTMENT</u>										
Exempt	-	-	-	1	-	-	5	7	126	
Other	-	-	-	6	-	-	19	12	372	
Total	-	-	-	7	-	-	24	19	498	
<u>EMPLOYEE & PUB. RELATIONS DEPARTMENT</u>										
Exempt	22	6	6	7	9	7	13	11	297	
Other	71	50	42	45	54	41	119	116	1 472	
Total	93	56	48	52	63	48	132	127	1 769	
<u>RADIOLOGICAL SCIENCES DEPARTMENT</u>										
Exempt	1	-	34	-	-	4	19	66	130	
Other	3	-	47	-	3	21	17	180	291	
Total	4	-	81	-	3	25	36	246	421	
<u>GENERAL</u>										
Exempt	-	-	-	-	-	-	-	-	8	
Other	-	-	-	-	-	-	-	-	3	
Total	-	-	-	-	-	-	-	-	11	
Total Exempt	113	113	118	79	97	156	331	459	2 230	
Total Other	360	382	405	406	322	483	1 436	1 092	7 087	
GRAND TOTAL	473	495	523	485	419	639	1 767	1 551	9 317	

* Includes White Bluffs and B-Y Exchange

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MANUFACTURING DEPARTMENT

AUGUST, 1955

METAL PREPARATION SECTION

A total of 423 tons of acceptable slugs were produced during the month. The production was 94 percent of the official forecast and consisted of 363 and 60 tons of solid and cored material respectively. The composite canning yield was 72 percent, representing a nine percent increase over the July yield. The yield improvement resulted principally from the reduction of inclusion rejects. Although there were other factors which contributed to the improvement, intensive efforts toward removing impurities from the process stream, steel sleeves, and autoclaves appear to have resulted in fewer inclusion rejects. In addition to regular production work, about 48 tons of depleted uranium slugs were canned for the Purex facility.

The inventory of acceptable canned slugs was reduced to less than a one week supply because of heavy reactor discharges and low production yields. The bare slug inventory was maintained at approximately 1-1/2 weeks supply.

There were no autoclave failures during the month.

REACTOR SECTION

The total and plutonium input productions were 112.4 and 112.3 percent of the official forecast respectively. Higher than forecast reactor levels and efficiencies resulted in the production exceeding the forecast.

The reactor time operated efficiency was 75.3 percent which was 5 percent higher than the previous month and exceeded both official and goal forecasts. The primary factors affecting efficiency included completion of the horizontal rod replacement programs at B and H Reactors, outages for process tube leak testing at D, F and KW Reactors, outages at KE and KW Reactors associated with malfunctioning of electrical equipment, and a relatively high slug failure rate. The reactor time operating efficiency, excluding the scheduled outages for rod replacement, was 80.9 percent.

The established maximum operating levels, excluding enrichment burnout, were increased a total of 57 megawatts; 42 at H Reactor and 15 at KE Reactor. At H the increase resulted from increased water flow following venturi installation, along with increased exit water temperature, graphite temperature, and pile helium content limits. At KE, the increase resulted from improved flattening.

The plutonium megawatt day output production was 140.3 percent of the official forecast and was high as the result of two unscheduled discharges at F Reactor, one to reduce slug rupture potential and one for reactivity control. The output production established a monthly record. The discharge tonnages of high and low concentration material were 391 and 85 respectively.

There were 22 slug failures during the month consisting of 20 regular uranium slugs and two enrichment pieces. For the second consecutive month all failures occurred in C, D, DR and F Reactors. The total reactor outage time for rupture removal was 240 hours.

Thirty-six reactor scrams occurred, 23 of which were caused by normal Panellit variables with 15 of these occurring at H Reactor after Panellit gauge and orifice replacement. Six scrams occurred at KW, four of which resulted from malfunctioning electrical equipment at 165 KW, one resulting from a water pressure drop during pump changing, and one from a tube failure in a voltage regulator circuit. Five scrams occurred at KE, three of which resulted from electrical and instrument difficulties at KW, and two from electrical difficulties in KE Reactor instrument circuits. Two scrams occurred at the B Reactor, one resulting from a tube exceeding the outlet temperature limit and one from an electrical short in an instrument circuit. The total outage time attributed to these scrams was 240 hours, of which 140 hours were due to the 100-K power difficulties.

The B Reactor horizontal rod replacement outage, which began July 8, continued through August 3. The major portion of the work accomplished during this outage was completed in July. H Reactor was shut down from July 31 to August 13 for a horizontal rod replacement outage. Eight of the horizontal rods were replaced, including seven of the old style and one prototype extruded rod with imbedded thermocouples. The other rods had been replaced previously during regular outages. Other work accomplished included the replacement of all Panellit gauges, replacement of beta monitoring slug failure detection equipment with gamma monitoring equipment, installation of all poison column control tubing (installation of the ball valves was delayed due to adapters of the wrong size), revision of the orifice pattern to provide 3000 gpm additional flow, and removal of ten process tubes for corrosion inspection.

Process tube leak testing programs were conducted at D, F, and KW Reactors, all on the basis of abnormal water collection rates. At D Reactor, five tube leaks were found during two programs involving approximately 600 tubes and 2000 tubes respectively. At F Reactor, one tube leak was associated with a slug failure, one tube leak was found on a crossheader which had been purged with chromic acid and seven tube leaks were found when all process tubes were tested.

The U-233 input production was 126.6 percent of the forecast and was high as the result of continuing the irradiation program longer than originally scheduled. At month end the balance of J-Q tubes at C and H Reactors was 62 and 51 respectively.

The shipping of irradiated J material was essentially completed in August. The remaining heel pieces from all reactors will be shipped in one final cleanup load in September.

SEPARATIONS SECTION

The Redox production was 223.6 percent of the official forecast and resulted from the postponement of a previously scheduled facility outage and higher than forecast rates. The T Plant production was 111 percent of the forecast.

The production rate of the Redox plant varied from 6 to 8 tons per day for the first six days of the month due principally to plugging of the centrifuge jet assembly. On August 6 a twelve-hour shutdown was caused by the plugging of the 1B column overflow line. Following startup on August 7, production rates were limited to 6 tons per day by partial plugging of the same overflow line. On August 11, the plant was shut down to flush the 1B and 1C column and to replace the centrifuge jet assembly. Operations were resumed on August 14. On August 16 the stream was transferred to the 1S (alternate extraction) column to allow necessary maintenance work to the 1A column letdown valve. After repairs were completed, on August 18, the 1S and the 1A columns were operated in parallel and rates were raised incrementally until a rate of 11 tons per day was achieved on August 25. This 11 ton rate continued throughout the remainder of the month.

The operation of the T Plant was essentially normal during the month. A major overhaul of the canyon crane was accomplished without production loss, as well as regeneration and replacement of silver reactors that were required for a special 131 test.

The TBP production was 104 percent of the official forecast. Extractant rates were increased early in the month in the first cycle in an effort to improve waste losses. This resulted in increased volume for the intercycle stripper and limited the feed volume to the second cycle to approximately 6 tons per day. A three day outage to flush the first cycle columns and organic storage tank was taken starting on August 8. Following this cleanout, the waste losses decreased from four percent to 2.5 percent. Decontamination of the final product was satisfactory throughout the month with feed material content of young wastes being increased from 25 to 67 percent. Total outage time for the two cycles was 87 and 57 hours respectively.

The UO_3 production was 147 percent of official forecast because of the high Redox rates. No process difficulties were experienced during the month.

In the Metal Fabrication Building production schedules for the processing of high MWD/T plutonium were completed. The process equipment was then completely cleaned, and fabrication of low MWD/T plutonium was started. All fabrication was confined to one type production with 85 percent of the official forecast being attained. Although the production schedule was lower than those of the past three months and sufficient material was on hand to meet the production forecast, the high ngs count prevented completion of the monthly commitment of acceptable cores.

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Adequate metal waste removal from the tank farms was maintained during the month. As of August 18 all waste metal in East Area had been removed.

GENERAL

Effective August 1, W. K. MacCready was appointed Manager, Manufacturing Department vice J. E. Maider who was transferred to another site on July 22, 1955. During the intervening period Mr. MacCready served as Acting Manager.

Personnel

On Roll August 1, 1955	5180
Net Increase	8
Total on Roll August 31, 1955	5188

W. K. MacCready
W. K. MAC CREADY, MANAGER
MANUFACTURING DEPARTMENT

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MANUFACTURING DEPARTMENT

PATENT REPORT SUMMARY
FOR
MONTH OF AUGUST, 1955

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

R. C. Hubbard, M-1442-6414
Separations Section

TITLE

Specific Depth Sampler for
Liquids.

W. K. MacReady
W. K. MAC READY, MANAGER
MANUFACTURING DEPARTMENT

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MONTHLY OPERATING REPORT

AUGUST 1955

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September 6, 1955

MANUFACTURING DEPARTMENT
METAL PREPARATION SECTION
August, 1955

I. RESPONSIBILITY

There was no change in responsibility during this period.

II. ACHIEVEMENTA. Operating Experience1. Statistics

	<u>August</u>	<u>July</u>	<u>Year to date</u>
Total Acceptable Slugs Canned (Tons)	423	343	3133
Composite Canning Yield (%)	72	63	75
Efficiency (%) (Canning Throughput)	94	92	94
Forecast Achievement (Current Commitment)	94	85	102
Net Acceptable Solid Slugs (Tons)	363	289	2903
Slugs Returned from Reactor (Tons)	4.10	6.3	40.97
Canning Yield (%)	72	63	76
Net Acceptable Cored Slugs (Tons)	60	54	230
Slugs Returned from Reactor (Tons)	.00	.07	.83
Canning Yield (%)	70	63	72
Autoclave Failure - Solid (No./M)	.00	.00	.001
Autoclave Failure - Cored (No./M)	.00	.00	.00
Acceptable C-4 Slugs Canned (Pieces)	0	0	5898
Acceptable Pb-Cd Slugs Canned (Pieces)	0	0	8863
Acceptable 10-66 Slugs Canned (Pieces)	0	1416	2113
Average Steam Generated (M lbs/hr)	23.9	22.5	
Maximum Steam Generated (M lbs/hr)	31.0	36.0	
Total Steam Generated (M lbs)	17,811	16,757	
Coal Consumed (Tons)	1,175	1,128	
Sanitary Water from 3000 Area (Million Gals.)	76.8	71.0	
Average Rate (GPM)	1,720	1,591	

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2. Activities

A net production of 423 tons of acceptable finished slugs achieved in 24 working days, including one overtime day, was essentially 94 percent of forecast. Sixty tons of this total were cored slugs. Six canning line-shifts per day were operated throughout the month and line relief for two lines was provided during the last week of the month. In addition to regular production, approximately 48 tons of depleted uranium slugs were canned for Purex start-up on two additional overtime days.

A composite yield of 72 percent was experienced in August. This is an improvement of 9 percent over the July yield. The yield improvement resulted principally from the reduction of inclusion rejects. Although there were other factors which contributed to this improvement, intensive efforts toward removing impurities from the process stream, steel sleeves, and autoclaves appear to result in fewer inclusion rejects.

The combined Metal Preparation and Reactor canned slug inventory was reduced to less than one week's supply during the month, due to heavy reactor discharges and low production yields in Metal Preparation. The bare slug inventory was reduced to about one and one-half week's supply.

No autoclave failures occurred during the month.

Essential material inventories were reduced this month by shipments of 4,844 pounds of virgin copper and 5,367 pounds of reclaimed tin to the Savannah River Plant. In addition, 12,120 pounds of copper tin crystals, 7,312 of used tin, and 5,042 of bronze were shipped to the National Lead Company of Ohio. These shipments essentially complete the disposal of all static and obsolete items in our essential material inventory.

Operating procedures for all equipment in the canning area and a temporary procedure for the new slug recovery equipment were completed this month. Procedures have been completed for about 60 percent of the finishing equipment. The over-all program is approximately 50 percent complete.

Major work was finished in renovating 3717 Building for the Mechanical Maintenance Metalworking Shop. Sheet metal and machine tools were moved and returned to service. Building 3722 has been vacated as scheduled.

Installation of the Hadley balance in 105-C Building was completed. This equipment will be used for weighing irradiated fuel elements under 16 feet of water. The weigh rod extends to the bottom of the basin through a pipe supplied with air lines for forcing out the water and drying the slug.

3. Special Operations

On August 17, uranium plug welding was discontinued and aluminum insert pressing substituted as the method of sealing cored slug chambers. All reject cored slugs in slug recovery are being recessed for aluminum inserts. Approximately 900 slugs per shift were being processed through the insert press at month-end.

A total of 1130 small diameter enriched uranium aluminum alloy "C" slugs were canned by the hot press process during the month.

A total of 481 thorium slugs were canned by the "C" process during the month. Yield statistics are not available as final inspection of this material was incomplete at month-end.

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4. Schedule Variance

Acceptable canned slug production was 94 percent of forecast. Production commitments were not met due to continued low canning yield.

B. Equipment Experience

1. Operating Continuity

The operating efficiency of the canning line was 94 percent during August, a two percent improvement over last month's performance. More consistent performance of new component preparation equipment was largely responsible for this improvement.

To alleviate the erratic operation of the pneumatic canning equipment, an air pressure booster tank was installed in the air supply system to minimize pressure fluctuations.

2. Inspection, Maintenance and Replacement

A method of sharpening Acme-Gridley cutoff machine facing tools by grinding them with a concave surface was developed. Metal turnings do not stick as readily to the concave surface of the tool, thereby virtually eliminating the need for operators to remove turnings while the lathe is in motion. In addition, the number of marred surface rejects caused by metal turning scratches has been reduced.

A fluoroscope set-up and adjustment gauge was designed and fabricated this month. The gauge, constructed of steel with machined reference surfaces, permits faster and more accurate adjustment of the fluoroscope equipment.

New cams were fabricated and installed on all production welders this month. The cams hold the electrode to the center of the cap until the arc has struck, thereby reducing the dragout of oxides into the weld bead.

Preliminary tests were conducted on the new cap and can Udyllite machines to evaluate possible hazards due to the presence of methanol. The machines were found acceptable from a safety standpoint while in operation. However, recommendations for additional safety provisions in the event of unusual conditions have been forwarded to the appropriate persons.

The third party inspection of boilers was made August 15 and 16.

C. Improvement Experience

1. Production Tests

PT-313-47MT "Cored Slugs from Extruded Blanks and Rolled Rods" HW-33189

A total of 60 tons finished eight-inch cored slugs was produced with a yield of 70%. Although this represents a 6% improvement over the previous period, an abnormal incidence of poor bond, frost test, and inclusion rejects has continued. Bare slug welding rejects averaged about 10% until August 17 when a complete conversion was made from the use of welded uranium plugs to pressed aluminum plugs.

Experience using the aluminum plugs in cored slugs has been very good both from the standpoint of quality and production. The assembly press was modified to press plugs in both ends of the slugs simultaneously, essentially doubling the throughput. All canning rejects processed with uranium and plugs are being successfully drilled re-counterbored, and undercut to accommodate aluminum plugs.

DECLASSIFIED**1. Production Tests - continued**

PT-313-56MT "Canning of Four Tons of Dingt Uranium for Pile Irradiation" HW-37 95

Four tons of dingt uranium slugs fabricated from special rod stock were outgassed in a chloride salt bath to reduce the hydrogen content. Because of the difficulty in removing surface oxide in the new spray-type pickle machine, canning by the lead dip process has been postponed until next period. In order to satisfactorily clean the slug surfaces, it is planned to supplement the spray pickle with a preliminary submerge pickle to remove excess oxide.

Under Supplement "A" to this production test, eight tons of regular dingt uranium were outgassed for lead-dip canning. This phase of the test has been issued for an extended evaluation of dingt uranium at a monthly rate which will be gradually increased to 33 tons in January, 1956. Slugs on hand will be processed as soon as suitable facilities are established for pickling.

PT-313-58MT "Fabrication of Double Length C Slugs" HW-37412

Difficulty with fillerarc welding equipment being used to weld "C" slugs end to end has limited progress on this test. To date only 102 pairs of unbonded "C" slugs have been successfully welded. The welding equipment is currently being modified for additional development and testing.

PT-313-60MT "Evaluation of the Irradiation Characteristics of Vertically Heat Treated Uranium" HW-38092

Approximately seven tons of eight-inch uranium slugs were received from Fernald which were vertically beta heat-treated in chloride salt followed by a delayed quench at Atlas Steels Limited of Canada. The slugs will be processed by the lead-dip process upon completion of preliminary laboratory analysis. It is planned to compare the pile performance of these slugs with standard material machined from rods horizontally heat-treated in carbonate salt.

3. Inventions and Discoveries

Personnel in the Metal Preparation 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**1. Labor Variance**

Direct labor unit costs will decrease .005 per unit as a result of a 9% increase in yield.

2. Material Variance

Unit costs for direct materials will be .022 per unit under the previous month as a result of the 9% improvement in combined yield.

3. Other Costs

Other costs will decrease .042 per unit as a result of a 23% increase in acceptable production.

DECLASSIFIEDE. Plant Development and Expansion

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1. Project Status

Project CA-514 "Expansion of 300 Area Production Facilities" - Indicated total cost of \$4,561,120 with an under-run of \$626,880. Work orders issued to Minor Construction Forces for exceptions are to be completed by October 15, 1955.

All old slug recovery equipment has been removed and construction in this portion of the building is completed. The press in the slug recovery section has been installed and neutralizing cycles have been run successfully for the past 15 days. Additional steam coils were installed in the treater and stripper tanks to provide sufficient heat for processing. A modified slug basket has been constructed for evaluation in the slug recovery section. If acceptable, a complete set of baskets will be constructed. Tests conducted on the methanol still indicated an insufficient boiler capacity. This is being studied by the Engineering Group. In order to eliminate a safety hazard, the vent lines of the caustic tank were extended to the ground. A new pump for the methanol storage tank is to be supplied.

The fume condition around the slug pickle machine has been alleviated by sealing the lids on the nitric acid tank, installing a baffle between the spray sample and the nitric acid tank, and installing a roof exhauster. The conveyors for the slug pickle machines have been completed. The component parts conveyor system has been completed and is ready for a run-in period. Acceptance tests were completed on the #1 cap and can machine. Exceptions include the relocation of electrical equipment to meet fire and safety code requirements. All gravity roof ventilators have been installed.

The installation of the furnace alarm system, furnace ventilating system and the ball table modification have been completed. The mold carts are 90% complete. Acceptance tests are in progress on the furnace conveyor system. Modifications to the quench tanks are 90% complete.

The stamping machines are being tested. Glare shielding has been installed in the welding booths.

Modifications have been made to the ball transfer tables on the radiography machines by increasing the number of ball casters so they will properly support the load of the radiography trays. A study is being made to determine the modifications necessary to increase the durability of these trays. The second radiography machine has been received and put into service. The pneumatic film conveyor system is being installed.

Ventilation at the final inspection station was modified to provide better distribution of air. The modification of the piping at the autoclaves heat exchanger has been completed and operating conditions improved. A design study is being made relative to the feedback problem encountered with the inter-communication system.

Work on the installation of blacktop walks and roadways near buildings 3703 and 3706 was resumed after a 30-day delay. General paint touch-up and the removal of old pipes, conduit and hangers continues.

Project CA-590 "Fly Ash Collection Equipment" - 384 building - The revised project proposal was transmitted to the Commission on August 23.

1. Project Status - continued

Project CA-601 "General Grounds Improvement" - 300 Area - The project proposal has been approved by the A.E.C. with scope reduction from \$96,000 to \$60,000. No Work Authority has been received.

Project CA-627 "Replacement of 300 Area Fence" - Actual work began on August 3, 1955 and is 22% complete.

Project CG-610 "Replacement of 313 Building Roof" - Work is nearing completion. The roof and foundations for exhausters over the cap and can area will be completed rather than remain as an exception as was previously anticipated.

Project CG-614 "Hanford 4X Program" - 300 Area - The three cut-off machines and two braze width inspection stations have been relocated. The lining of induction furnaces is 50% complete. A letter was written to the Commission on August 9, 1955 requesting a change from Minor Construction to a fixed price contractor for the change house portion of the project.

ER-A-3122 "Steam Plant Deaerator Replacement" - 384 Building - The present deaerator is not sufficient capacity to handle the anticipated load of the steam plant beginning in the winter of FY-1956. The proposal is being revised to incorporate additional data for economic justification.

F. Significant Reports Issued1. Routine

<u>Number</u>	<u>Title</u>	<u>Author</u>	<u>Date</u>
HW-38402	Monthly Report, Process Sub-Section, Metal Preparation Section, July 1955	E. W. O'Rorke	8-1-55
HW-38403	Monthly Report, New Fuel Element Production Program, July 1955	W. A. Blanton	8-1-55
None	Annual Landlord Report	R. S. Quarles	8-10-55
HW-38764	General Analytical Control Program I Uranium Metal, 5-1 to 6-30-55 - National Lead Company of Ohio	P. R. Anderson	8-23-55
HW-38765	General Analytical Control Program I Uranium Metal, 5-1 to 6-30-55 - Mallinckrodt Chemical Works	P. R. Anderson	8-23-55

2. Non-Routine

HW-38498	Current Trend in Rejection Rate of Canned Uranium Slugs for Braze Layer Porosity	S. M. Gill	8-4-55
HW-38443	Report of Uranium Accountability in Metal Preparation Processes for the Quarter Ending 6-30-55	W. G. Tews	8-2-55
HW-38472	Uranium Quality Control Analytical Results	G. B. Hansen	7-29
HW-38546	Economics of Increasing the Core Diameter of "F" Process Fuel Elements	R. A. Farran	8-8-55

III. PERSONNELA. Organization

No change.

B. Force Summary

	<u>Start of Month</u>		<u>End of Month</u>		<u>Net Change</u>	
	<u>Exempt</u>	<u>Non-Exempt</u>	<u>Exempt</u>	<u>Non-Exempt</u>	<u>E.</u>	<u>N. E.</u>
Section General	1	1	1	1	0	0
Operations	21	169	21	172	0	+3
Power & Maintenance	35	324	34	322	-1	-2
Process	37	69	36	66	-1	-3
Projects & Personnel	15	3	14	5	-1	+2
Section Total	109	566 (675)	98	574 (672)	-3	0

8 C. Safety Experience

Major injury #110 occurred on August 30, 1955 when an explosion occurred in a salt bath crucible in a heat treating furnace in the 328 Building. injured in the explosion. No other injuries or property damage resulted from the accident. There were no sub-major or near-serious incidents during the month.

D. Radiation Experience

No exposures in excess of 300 mrad occurred during August. Three exposures in excess of 200 mrad and 61 exposures in excess of 100 were reported.

Exposure of an employee above permissible limits nearly occurred when the employee removed a cardboard box containing a radioisotope from inside a roped and posted radiation zone and used it for a seat while inspecting some process material. Before an overexposure had occurred, the man was observed and informed of the contents of the box and subsequently removed from further radiation exposure work until his exposure could be determined. The incident has been discussed as a Class I Radiation Incident and is being published as Manufacturing Radiation Incident Investigation No. 507-R.

E. Personnel Activities1. Visits and Visitors

G. A. McFarland of the High Voltage Engineering Corporation visited the area to investigate problems relating to the positive ion accelerator in 3745-B Building.

2. Meetings

Forty-one safety and security meetings were held during the month. Five information, 36 round table and 30 staff meetings were held for Section personnel. Five training meetings were presented during this period with 49 persons attending. Training and educational films were shown to 75 members of the Section.

A dinner get-together was held August 25 for all exempt members of the Section.

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HW-38828

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Richland, Washington
September 8, 1955

MANUFACTURING DEPARTMENT
REACTOR SECTION
MONTHLY REPORT
AUGUST, 1955

I. RESPONSIBILITY

Assigned responsibilities of the Reactor Section were not changed during August.

II. ACHIEVEMENT

A. Operating Experience

Reactor time operated efficiency was 75.3 per cent, approximately five per cent higher than during the previous month. The primary factors contributing to this continued relatively low efficiency included completion of the B Reactor horizontal rod replacement outage, the H Reactor rod replacement outage, leak testing programs at D, F, and KW Reactors, outages at KE and KW Reactors associated with malfunctioning of electrical equipment, and a continued relatively high slug failure rate.

Total and plutonium input productions exceeded forecast 12.4 and 12.3 per cent, respectively, in both cases as the result of higher than anticipated levels and efficiency.

Thorium input production exceeded forecast 26.6 per cent as the result of continuing the irradiation program longer than anticipated. Production at C and H Reactors charged to thorium irradiation was 3.4 and 2.7 per cent, respectively.

A. Operating Experience (Continued)

Plutonium megawatt day output production was 140.3 per cent of forecast primarily as the result of two unscheduled discharges at F Reactor, one for slug failure control, and one for reactivity control. Higher than forecast levels in recent months also contributed to the above forecast production which established a new megawatt day record for one month.

The goal concentration of low concentration material was decreased 10 megawatt days per ton to improve plutonium quality. Concentrations of production and the D Reactor pilot program material remained unchanged. Tons discharged at the low and production concentrations were 391 and 85. The latter figure included 1.5 tons of D Reactor pilot program material.

Established maximum reactor operating levels, excluding enrichment burnout, were increased a total of 57 megawatts, 42 at H Reactor and 15 at KE Reactor. At H Reactor, the increase resulted from increased flow following venturi installation, together with increased effluent water, graphite and helium limits. At KE Reactor, the increase resulted from improved flattening.

There were 22 slug failures in August, compared to 16 in July and 28 in June. For the second consecutive month, all failures occurred at C, D, DR, and F Reactors, with none at B, H, KE, and KW Reactors.

	<u>C</u>	<u>D</u>	<u>DR</u>	<u>F</u>	<u>Total</u>
Eight-Inch Regular	2	8	1	9	20
"C" Material	1				1
"J" Material			1		1
	<u>3</u>	<u>8</u>	<u>2</u>	<u>9</u>	<u>22</u>

Reactor outage time required for the removal of these ruptures was 240 hours.

1. Statistics

Operating statistics are summarized in the table on Page 3.

2. Activities

The B Reactor horizontal rod replacement outage, which began July 8, continued through August 3. The major portion of the work accomplished during this outage was completed in July, and is described in the July report.

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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 Average
Reactor Time Operated Efficiency (%)	86.3	79.6	73.4	88.8	61.9	55.3	83.1	73.9	75.3
Reactor Outage Time (Hrs) Plutonium Production Special Irradiations and Tests	101.9 - -	151.7 - -	198.2 - -	77.7 4.4	265.1 18.0	332.5 -	125.9 -	194.0 -	1448.0 22.4
Total Outage Time Reactor Unscheduled Outage Time (Hrs)	101.9 8.2	151.7 70.0	198.2 135.0	83.1 30.2	283.1 283.1	332.5 8.7	125.9 86.0	194.0 99.2	1470.4 720.4
Metal Discharged (Tons)	41.3	154.7	23.8	52.7	40.8	68.5	5.7	87.8	475
Water Quality (ppm Turbidity)									
Raw Water - Average	5	5	4	5	5	4	5	6	
Raw Water - Maximum	8	10	9	7	7	6	8	8	
Process Water - Average	.004	.004	.005	.005	.005	.005	.003	.004	
Process Water - Maximum	.004	.008	.006	.006	.006	.006	.003	.005	
Water Pumped (MM Gals)									
Bldg. 190 to Reactor	2000	3232	1906	2076	1554	1826	5348	4705	22647
Bldg. 182 to 200 Areas	514								514
Bldg. 181		6564	4846		1914	2193	5504	4991	26012
Steam Generated (MM Lbs)		159	231		105	98	22	20	635
Coal Consumed (Tons)		10053	15984		10711	5435			42183
Oil Consumed (M Gals)							246	214	460

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

H Reactor was shut down from July 31 to August 13 for a horizontal rod replacement outage. Eight of the horizontal rods were replaced, including seven of the old style and one prototype extruded rod with imbedded thermocouples. The other rods had been replaced previously during regular outages. Other work accomplished included the replacement of all Panellit gages, replacement of beta monitoring slug failure detection equipment with gamma monitoring equipment, installation of all poison column control tubing (installation of the ball valves was delayed due to mechanical difficulties), revision of the orifice pattern to provide 3000 gpm additional flow, and removal of 10 process tubes for corrosion inspection.

High quality process water was produced without difficulty during the month by all filter plants. Improved raw water quality permitted discontinuance of activated silica as a coagulant aid at Buildings 183-D and 183-F (Buildings 183-B, DR and H discontinued in July, Buildings 183-KE and KW in May). Silica feed at Buildings 183-C has been continued as specified in Development Test 105-558-E, "Evaluation of High Na₂O Neutralization in Activated Silica Preparation."

There were no charge-discharge activities associated with the J-Q irradiation program. The month end balance of J-Q tubes at C and H Reactors remained 62 and 51, respectively.

The shipping of "J" material from DR Reactor to Arco, Idaho, was completed on August 8, except for a few heel pieces. Seven casks containing 980 pieces were shipped in August. The remaining heel pieces from all reactors will be shipped in one final "clean-up" load.

The shipping of Mint material to Savannah River Works by railroad began during August, with nine casks containing approximately 8,300 pieces. Shipments will continue at a rate of nine casks per month, with the final shipment scheduled for November 28, 1955.

The following table indicates activities during August associated with special irradiations other than the J-Q program noted above:

	<u>Tubes Charged</u>	<u>Tubes Discharged</u>	<u>Casks Shipped</u>
Production Tests	12	31	1
Rala		4	1
Mint (flattening)	4	12	9
Chemical 10-66	31		1
"B" Material	2	2	
Totals	<u>49</u>	<u>49</u>	<u>12</u>

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HW-38828-17

B. Equipment Experience

Thirty-six reactor scrams occurred, 23 of which were caused by normal Panellit system variables. (Fifteen of the 23 occurred at H Reactor immediately after Panellit gage and orifice replacement.) Six scrams at KW resulted from the following causes:

- a. Unexplained deviation from normal power conditions complicated by failure of emergency generators to pick up load. (Complete details on this incident are contained in special reports (see Significant Reports).)
- b. Failure of power from Building 165 KW when unscheduled operation of a relay isolated a bus bar.
- c. Low pressure Panellit trip caused by flow of water from KW Reactor risers to KE Reactor as the result of incorrect wiring of guard valve.
- d. Failure of tube in voltage regulator circuit of a flux monitor.
- e. Momentary drop in water pressure during pump change.
- f. Building 165 KW power failure, the cause of which was not determined.

Five scrams at KE Reactor resulted from the following causes:

- a. Low pressure Panellit trip when emergency water was supplied to KW Reactor after power failure (a, above).
- b. Power surge originating at Building 165 KW following restoration of power at 100 KW facilities (b, above).
- c. Flux monitor scram at KW Reactor (d, above).
- d. Annunciator alarm on horizontal rod water pressure attributed to dirty relay contacts.
- e. High level octant monitor trip caused by unbalanced flux.

Two scrams occurred at B Reactor, one when a tube exceeded outlet temperature limits as the result of a wrong size orifice, and one when a light in the 10 point recorder shorted out causing an under voltage condition. Total outage time attributed to all scrams was approximately 240 hours of which approximately 140 hours was due to 100-K Area power difficulties.

B. Equipment Experience (Continued)

At KW Reactor, front face pigtails were "exercised" by raising and lowering water pressure. No evidence of extrusion was found. The nine prototype "Resistoflex" pigtails installed in June continue to perform satisfactorily.

Sixty temperature monitor elements at KW Reactor were replaced and seven at KE Reactor, making totals of 227 and 125 to date that have been replaced at KW and KE Reactors, respectively.

Process tube leak testing programs were conducted at D, F, and KW Reactors, all on the basis of abnormal water collection rates. At D Reactor, five tube leaks were found during two programs involving approximately 600 tubes and 2000 tubes, respectively. At F Reactor, one tube leak was associated with a slug failure, one tube leak was found on a crossheader which had been purged with chromic acid (see Improvement Experience), and seven tube leaks were found when all process tubes were tested.

At KW Reactor, testing of all tubes, control rods and shield cooling tubes failed to reveal any leaks. It was postulated that the abnormal water was resulting periodically from the biological shield. At month end, D Reactor collection rates had returned to normal, but F Reactor rates remained high indicating additional leaks.

Process water pump experience included failure of No. 9 Building 190-B pump motor during a routine start due to arcing through worn winding insulation, failure of impeller vanes in the fluid drive assembly of No. 9 Building 190-C pump unit, detection of cracked vanes in No. 12 pump unit in the same building, and excessive vibration of No. 3 Building 190-B primary pump due to misalignment of the suction pipe during Project CG-558 tie-in work.

Panellit gage reliability checks at seven reactors revealed 42 faulty trips.

<u>Reactor</u>	<u>High Trips</u>	<u>Low Trips</u>	<u>Misc.</u>	<u>Total</u>
B	4	2	-	6
C	1	1	-	2
D	1	1	3	5
DR	1	2	-	3
F	2	1	-	3
KE	13	7	-	20
KW	2	1	-	3
Totals	24	15	3	42

B. Equipment Experience (Continued)

In addition to the above, 389 gages at KW Reactor and 285 at KE Reactor were found to have mercury separation in the switches. Those gages which were found to be repeaters were replaced, with replacement of all gages showing this condition planned as spare gages become available.

C. Improvement Experience

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

- PT-105-579-A (Quantity Irradiation of J-Q Columns)
No activity relative to this test occurred in August. The month end balance of tubes being irradiated remained 62 at C Reactor and 51 at H Reactor.
- PT-105-7-MR (Irradiation of High Quality Production Uranium Slugs)
The nine remaining tubes at H Reactor on a run to rupture basis continued without incident, and averaged 1325 megawatt days per ton concentration at month end.
- PT-105-354-E (KAFL-120 Recirculation Loop)
At H Reactor, installation of the recirculation loop was completed. Checking of electrical circuits was in progress at month end.
- PT-105-600-A (Periodic Measurement of the Graphite Temperature Coefficient of Reactivity of the KE Reactor)
KE Reactor was shut down on August 10, to check horizontal rod calibration as specified in the test.
- PT-105-522-E (Examination of Pile Process Tubes)
At H Reactor, 10 tubes were removed during the horizontal rod replacement outage and transferred to the Engineering Department for study of corrosion effects.
- PT-MR-105-12 (Crossheader Purge With Chromic Acid)
This test, conducted at F Reactor on August 10, demonstrated that recirculation of hot chromic acid could be accomplished without adverse effects on reactor components or tube loadings, and without serious radiation hazard. However, analysis of the data indicates that recirculation of the acid did not result in any significant reduction in the radiation level of the header.

~~DECLASSIFIED~~C. Improvement Experience (Continued)

One new and seven revised Process Standards - Reactor were approved and issued. These were Standards titled: "Make-Up of Aluminum and Aluminum Alloy Tube Charges," "Process Tube Outlet Water Temperature Limits - Trip-Before-Instability," "Properties of Process Tubes," "Power Level Monitoring - Flux Monitors," "Horizontal Rod Withdrawal - Rate and Power Increase Limits," "Earthquake - Seismoscope Operation," "Charging Elevator - Interlock," and "Sub-Normal Electrical Power Conditions." The most significant changes accomplished by these new and revised standards included the use of four-inch uranium slugs in the upper third of B, D, and F Reactors as necessitated by graphite distortion, and the relaxation of flux monitor trip settings during power level increases to minimize trip setting adjustments.

At KE Reactor, the octant monitor system was placed in the No. 1 safety circuit to serve as a back-up for the flux monitors and to control serious flux transients.

At B and C Reactor, a design change of the Beckman safety circuit inter-tie was completed. This change requires that two Beckmans trip at one reactor before the other reactor is scrammed, and should minimize the number of inadvertent scrams resulting from Beckman adjustment.

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

Reactor Section costs are expected to be approximately \$100,000 greater in August than in July. Major factors which adversely affected costs during August included an increase in the number of slug failures, major process tube leak testing programs at three reactors, maintenance work during the extended horizontal rod replacement outages at B and H Reactors, electrical power operational difficulties at 100-K Area, the tube replacement program at F Reactor, and a \$54,000 increase in fuel costs resulting from a 19.2 per cent increase in steam generation.

Beneficial effects on Reactor Section costs in August were limited primarily to a decrease of approximately \$11,000 in water treatment chemical costs (despite of a 2.8 per cent increase in total flow) as the result of improved raw water quality.

With August production only slightly higher than July production, and with total costs in August anticipated to be \$100,000 greater than in July, preliminary estimates indicate that both

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HW-38828

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D. Events Influencing Costs (Continued)

plutonium and total irradiation costs will be approximately three per cent higher in August as compared to the previous month.

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, "FAR Stainken to RS Bell, dated August 19, 1955.

CA-512

(100-K Plant)

Unexpected fabrication difficulties experienced by the vendor of the replacement flexible front face connectors have necessitated rescheduling of the replacement program at KE and KW Reactors from approximately September 12, to early in October. Approximately 5800 interim Edison type temperature monitor bulbs have been received, with the remainder promised by November 15. After an investigation of filter backwash valve operation by representatives of Roberts Filter and Chapman Valve Companies, a decision was reached that the valves would be replaced on an emergency basis, with financial responsibility to be determined later. It was recommended that physical stops be installed on all valves as soon as possible.

CG-558

(Reactor Plant Modification for Increased Production)

A directive was received from the AEC approving the proposal for Phase II of the project, complete modification of 100-F and H Areas at \$11,200,000 additional cost. The replacement of horizontal rods and Panellit gages at H Reactor, completed August 13, is described under the Activities section. Construction in the water plants and reactor areas is progressing according to schedule.

CG-578

(Effluent Water Monitoring Improvements - 100-B, D, DR, F, and H Areas)

The gamma monitoring facilities installed at H Reactor during the horizontal rod replacement outage are operating satisfactorily. Preparations are being made to install similar equipment at DR Reactor during the Panellit outage.

E. Plant Development and Expansion (Continued)2. Plant Engineering

A number of engineering and development studies were active in the Section during August. The studies are, in general, aimed at decreasing costs and/or increasing production. Details are given in Document HW-38910. Several items of interest are reported below.

The five gpm experimental filter plant was completed and placed in operation during August. Preliminary functional tests showed the plant to be satisfactory in all respects. Coagulation, settling and filtration data are currently being obtained on activated silica prepared by a new process at the 100-C Area plant.

Development of improved tube removal equipment continued during August. The optimum shape and size of a tube weakener-splitter combination was determined in laboratory tests. A spiral broach-expanding mandrel combination has been developed which makes it possible to broach a graphite channel while inserting a new process tube, materially decreasing tube replacement time. A tube magazine has been developed to support new tubes prior to insertion. The magazine incorporates a vacuum system to remove graphite dust from the channel during tube insertion.

F. Significant Reports1. Routine

Monthly operating reports issued for July were:

HW-38375-A	Reactor Section	R. S. Bell	8/7/55
HW-38432	Operations Sub-Section	A. R. Maguire	8/1/55
HW-38435	Process Sub-Section	O. C. Schroeder	8/1/55
HW-38385	Projects and Personnel Development	F.A.R. Stainken	8/1/55
HW-38611	Radiation Monitoring Sub-Section	P. C. Jerman	8/3/55
-	Maintenance Sub-Section	E. E. Weyerts	8/3/55
HW-38461	Power Sub-Section	J. C. McLaughlin	8/3/55

Other routine reports issued during August included:

HW-38762	"Monthly Progress Report, Reactor Section Expansion, August, 1955"	J. P. Langan	8/24/55
-	"Status of Reactor Section Projects, Informal Requests, and Budget Items"	F.A.R. Stainken	8/19/55
HW-38408	"Reactivity Balance and Associated Data - Period July, 1955"	A. P. Vinther	8/1/55

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F. Significant Reports (Continued)

2. Non-Routine

HW-38068	"A Review of the Emergency Water Supply Systems"	N. V. Starkebaum G. H. Dyer	7/15/55
HW-38373	"A Summary of K Reactor Flow Test Data"	P. C. Walkup K. W. Hess	8/8/55
HW-38563	"Progress Report - I, An Offsite Investigation of Radiological Protective Apparel"	J. S. Corbett C. M. Unruh	8/10/55
HW-38582	"Use of Stay Bolts to Withhold Axial Tube Forces Released When Using O-Rings Instead of Van Stone Flanges"	C. W. Botsford	8/16/55
HW-37967	"Process Test MR-105-28, Functional Test of O-Ring Seal Nozzles"	G. H. Dyer	7/18/55
HW-38304	"Safety Circuit Bypass Switches"	R. R. Bloomstrand	8/1/55
HW-38393	"Measurement of the Sensitivities of Reactor Neutron Flux Monitor at KW Reactor"	R. E. Dunn	8/1/55
HW-38475	"Measurement of the Sensitivities of Reactor Neutron Flux Monitors at B Reactor"	C. N. Knudsen	8/3/55
HW-38574	"Measurement of the Sensitivities of Reactor Neutron Flux Monitors at DR Reactor"	D. E. Goins	8/10/55
HW-38721	"Measurement of the Sensitivities of Reactor Neutron Flux Monitors at H Reactor"	S. R. Stamp	8/22/55
HW-33685	"A Possible Slug Rupture Mechanism"	W. E. Cawley	5/27/55
OUO	"Emergency System Power Failure - 165-KW"	R. G. Benham L. P. Reinig	8/26/55

III. PERSONNEL

A. Organization

Effective August 1, the following appointments involving Reactor Section personnel were made:

1. W. K. MacCready, formerly Manager, Reactor Section, was named Manager, Manufacturing Department.
2. R. S. Bell, formerly Manager, Separations Section, was named Manager, Reactor Section.
3. J. H. Warren, formerly Superintendent, Reactor Production, Operations Sub-Section, was named Manager, Separations Section.
4. A. R. Maguire, formerly Superintendent - 100 Operations, was named Superintendent, Reactor Production, Operations Sub-Section.

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DECLASSIFIED**A. Organization (Continued)**

Effective August 19, R. O. Mehan, Technical Specialist, Reactor was transferred to the Commonwealth Edison Project.

B. Force Summary

	<u>Beginning of Month</u>	<u>End of Month</u>	<u>Net Change</u>
Section General	2	2	0
Operations	379	378	- 1
Maintenance	630	639	+ 9
Projects & Personnel Devl.	49	52	+ 3
Power	483	486	+ 3
Process	75	76	+ 1
Radiation Monitoring	91	89	- 2
Section Total	1709	1722	+ 13

Changes during August included 15 transfers into the Section, six transfers out of the Section, 11 new hires, six terminations, one reactivation, and two deactivations.

C. Safety Experience

There were no Major Injuries in the Reactor Section during August. However, there were five Sub-Major Injuries during that period. No. 279 occurred at Building 183-H on August 2, when a manhole cover, which was leaning against a railing, slipped down, breaking a toe of a Power Sub-Section supervisor. No. 280 occurred at 105-H on August 5, when an Operations Sub-Section Operator caught his hand between the doors of the freight elevator and sustained a broken finger. No. 282 occurred at Building 105-C on August 18, when an Operations Sub-Section operator caught his finger between a transfer area crane hook and a "J" cask trunnion, resulting in a fracture of the finger. No. 283 occurred at Building 105-C on August 19, when the welded leg of a base plate broke off, allowing the plate to drop on a Maintenance Sub-Section employee's foot, breaking a bone in the arch. No. 284 occurred at Building 105-KE on August 25, when a cover plate from the temperature monitor fell on a Maintenance Sub-Section employee's foot, breaking a bone.

D. Radiation Experience

There was one Class I and no Class II Radiation Incidents in the Reactor Section in August. Class I Incident No. 500 occurred at Building 105-H on August 9, when a Minor Construction employee was potentially overexposed as he sat on a small

D. Radiation Experience (Continued)

but highly radioactive source for three minutes before it was discovered. Complete details relative to this incident can be found in Document HW-38767.

Effective August 1, as a part of a general review and re-issue of Special Work Permits as Radiation Work Procedures, the 105 Building exclusion areas were designated as Radiation Areas, with all individuals entering the area for two or more hours per day assuming a two mrem exposure for that day in addition to whatever other exposure they may receive in the course of their work.

E. Personnel Activities

At month end, 15 employees are receiving on-the-job training for engineering or supervisory assignments in the Section; 12 of these are on assignment under the rotational training program.

The August, 1955, issue of "Nucleonics" magazine contained a feature article, "Using Boron Trifluoride Gas for Reactor Control" prepared by W. E. Cawley of the Process Sub-Section. This article had previously been presented as a paper at the 1955 Conference on Nuclear Engineering at the University of California at Los Angeles in April, 1955.

Information meetings for exempt employees included 16 meetings on non-exempt employee ratings with a total attendance of 145, and eight additional (eight were held in July) presentations of the film "Inner Man Steps Out," for a total attendance of 185 for the 16 showings.

A series of five discussion meetings, one in each 100 Area, on the revised Uniform Filing System Index were presented by representatives of the Records Operations Unit for Reactor Section personnel, primarily secretarial people.

C. W. Botsford of the Process Sub-Section visited the Huntington Rubber Company at Portland, Oregon, on August 9, regarding fabrication of rubber devices required for maintenance equipment.

P. H. Hutton of the Process Sub-Section attended a two-week course on "Noise Reduction" at the Massachusetts Institute of Technology, Cambridge, Mass., beginning August 15.

J. E. Robb of the Process Sub-Section visited the following firms during the period August 20 to 30, to discuss O-ring seals, packings, and ball valves with regard to the charge-discharge during operation program:

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Personnel Activities (Continued)

Precision Rubber Products Corporation	Dayton, Ohio
The Bonnot Company (Hydromotor Div.)	Canton, Ohio
Parker Appliance Company	Cleveland, Ohio
Garlock Packing Company	Palmyra, New York
The M. W. Kellogg Company	Jersey City, New Jersey
Janesbury Valve Company	Worcester, Mass.
Rockwood Sprinkler Company	Worcester, Mass.

J. C. McLaughlin, Power Sub-Section Superintendent, visited the Detroit, Michigan, offices of the American Blower Corporation on August 25 and 26, to expedite delivery of repair parts for fluid drive components of Building 190-C process pump units.

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Richland, Washington
September 7, 1955

MANUFACTURING DEPARTMENT
SEPARATIONS SECTION
AUGUST 1955

I RESPONSIBILITY

Responsibilities of the Separations Section were unchanged during the month of August, 1955.

II ACHIEVEMENT

A. Operating Experience

1. Statistics

a. Bismuth Phosphate Operations

	<u>August</u>		<u>July</u>	
		<u>Acid</u>		<u>Acid</u>
	<u>Normal</u>	<u>Wash</u>	<u>Normal</u>	<u>Wash</u>
Charges started in Canyon Bldgs.	89	2	81	4
Charges completed in Conc. Bldgs.	90	2	84	2
Special charges - Conc. Bldgs.	3		16	
Charges completed-Isolation Bldg.	84	2	89	2
Average Waste Losses, %	3.0		3.6	
Special charges - Isolation Bldg.	8		7	

DECLASSIFIEDa. Bismuth Phosphate Operations (Continued)

	<u>August</u>		<u>July</u>	
	<u>Normal</u>	<u>Acid Wash</u>	<u>Normal</u>	<u>Acid Wash</u>
Material balance, %	98.8		100.3	
Yield through Process, %	95.8		96.7	
Average cooling time (days)	108		108	
Minimum cooling time (days)	76 (Special)		97	

b. Redox Operations

	<u>August</u>	<u>July</u>
Equivalent charges started	161.0	152.0
Charges completed	169.1	197.6
Tons Uranium delivered to storage	228.9	159.2
Average Production Rate per Operating day, Tons	8.4	7.5
Average Daily Operating Rate for the month, Tons	7.5	5.1
Average yield, %		
Uranium	99.2	98.7
Plutonium	104.0	104.5
Total Waste Loss, %		
Uranium	0.79	0.96
Plutonium	0.71	0.62
Average cooling time, days	109	102
Minimum cooling time, days	96	89
Percent down time	13.4	31.3

c. 231

	<u>August</u>	<u>July</u>
Batches started	95	118
Batches completed	96	113
Batches awaiting processing	12	5

d. 234-5 Operations

	<u>August</u>	<u>July</u>
Batches completed through Task I	128	133
Batches completed through Task II	124	130
Runs completed through Task III	44	71
Waste Disposal (Units)	16.34	8.34

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e. UO₃ Operations

	<u>August</u>	<u>July</u>	<u>To Date</u>
Uranium drummed, Tons	339.61	262.57	10,613.37
Uranium shipped, Tons	374.33	254.31	10,601.39
Average cooling time, days	115	108	
Minimum cooling time, days	102	95	
Waste Loss, %	0.02 est.	0.02 est.	

f. TBP Operations

	<u>August</u>	<u>July</u>	<u>To Date</u>
Tons received from Metal Removal	147.53	104.36	5,802.52
Tons shipped to UO ₃ Plant	146.04	97.10	5,608.06
Average Production Rate per Operating day, Tons	5.11	4.62	
Average Daily Operating Rate for the Month, Tons	4.71	3.13	
Average yield, %	95.43	97.31	
Total Waste Loss, %	3.25	3.83	
Ratio Actual Waste Volume returned to Theoretical Volume	0.79	0.70	
Percent Down Time	7.74	32.25	

g. Power

	<u>200 East</u>	<u>200 West</u>
Raw water pumped, gpm	3 170	8 353
Filtered water pumped, gpm	545	1 197
Average steam generated, lbs/hr	26 198	155 041
Maximum steam generated, lbs/hr	66 000	212 000
Total steam generated, M lbs.	19 491	115 351
Coal consumed, tons (est.)	1 344	7 273

h. Waste Storage

	<u>Equivalent Tons U</u>	
	<u>August</u>	<u>July</u>
Metal Waste reserve storage capacity-T Plant	122	273
1st Cycle reserve storage capacity-T Plant	410	219
Metal Waste reserve storage capacity-B Plant	685	685
1st Cycle reserve storage capacity-B Plant	74	74
Redox Waste reserve storage capacity	305	407

2. Activities

a. Redox Processing

Extraction battery rates varied from 6 to 8 tons uranium per day during the first six days of the month due to trouble experienced with plugging of the centrifuge feed jet assembly. On August 6 the 1B column overflow line plugging experienced last month re-occurred necessitating shutdown of the plant for twelve hours while flushing was completed. During this downtime, the first cycle make-up tank (H-1) to first cycle feed tank (F-7) pump was replaced because of a leaking shaft seal and a special flush made of the centrifuge feed tank (G-5). Following startup on August 7, production rates continued to be limited by the partial plugging of the 1B overflow, with a maximum sustained rate of only 6 tons per day being possible. On August 11 the plant was shutdown for a three day period and a flush was made of the 1B and 1C columns. A new jet assembly was installed in the centrifuge feed tank and further flushing of this system made to improve performance. However, after startup on August 14, the head end continued to limit rates due to faulty jet operation. On August 16 the 1A column let down valve became inoperative, apparently due to a leak in the air supply jumper to the control valve, and necessitated a short shutdown while the 1S column was started up to pick up the production load. After repair of the 1AW letdown valve assembly on August 18, 1A and 1S columns were operated in parallel and rates were raised incrementally until a rate of 11 tons uranium per day was achieved on August 25. This rate was maintained through the month end without experiencing any further trouble with the 1B column overflow. The centrifuge feed jets have, with the help of frequent backflushing, been able to sustain this rate. Flooding in the 2E column (second uranium cycle stripping column) limited production to a maximum of 11 tons per day.

b. Metal Recovery1) TBP Processing

At month end second cycle production of 6 tons was being attained and the monthly commitment was achieved in the face of high waste loss problems. In an effort to correct these waste losses it was necessary to increase the first-cycle (RC column) extractant rates. This resulted in increased volume to be handled by the intercycle stripper and limited the second-cycle intake. An approximate three day first-cycle outage was taken August 8 - 11 to flush the first cycle columns and the RCU tank to reduce losses which process manipulation was unable to correct. Pooled waste loss decreased from about 4.0 percent to approximately 2.5 percent.

During the month the amount of UR farm "young" feed (Minimum age - 16 months) was increased from a ratio of 25 percent to 67 percent of the total tank farm feed shipped, with adequate

1) TBP Processing (Continued)

first and second cycle decontamination being achieved with the increase. At month end the first cycle product (RCU) gamma activity ranged from 5,000 to 10,000 gamma percent and the second cycle product (REU) activity was in good control at less than 100 gamma percent. For the month, uranium concentration of the tank farm feed averaged 0.193 lbs. U/gallon.

2) UO₃ Processing

No process difficulties were experienced during the month; however, production was limited by the amount of feed material available. Feed material consisted of 44 percent TBP-REU and 56 percent Redox-UNH.

3) Waste Metal Removal

Adequate TBP Plant feeds were maintained all month. Dilute feed material processed from the tank farms during the early part of the month consisted of supernate and water-slurry blends from the TXR farm and supernate from the BXR and UR farms. On August 19, the final feed shipment from the 109-BY tank (East Area) was made. At month end, TBP Plant feeds consisted of blends of 67% material of minimum age of 16 months.

c. T Plant Processing

The loss in potential processing time caused by special tests and equipment problems did not seriously affect production. Unit production was approximately 111% of forecast.

I¹³¹ emission at T Plant continued to be a problem this month. With the exception of one four ton charging of 76 day cooled metal, which was made to evaluate the operating characteristics of a back-up silver reactor, all metal dissolved during the period was cooled more than 90 days. The average cooling time for the metal dissolved during the period July 27 through August 26 was 106 days and the average I¹³¹ emission during the same period was 0.47 curies per day.

d. Isolation and Metal Fabrication

The over-all performance of the Isolation Building operation continued to be satisfactory although some difficulties were still experienced with poor settling of the precipitates. Twenty-two special runs on which only one peroxide precipitate had been made were shipped. Processing of further material with a single precipitate will await purity results from the customer location.

d. Isolation and Metal Fabrication (Continued)

In the Metal Fabrication Building production schedules for the processing of high MWD/T Pu were completed. The process equipment was then completely cleaned of all high MWD/T Pu and the production of low MWD/T Pu was initiated. All fabrication was confined to one type production.

3. Special Operations

a. Waste Evaporators

Both 242-B and 242-T evaporators continued in standby. Minor Construction started erection of scavenging facilities at 242-T this month.

b. Pu Recovery - Metal Fabrication

The recovery facilities were used primarily for the dissolution of high MWD/T scrap metal and powders. This was done to provide additional feed for the Recuplex facility. The Recuplex facility was used to process supernatant and cleanouts from Task I during and following the change-over from high to low MWD/T production at the Redox and RMA Line locations. Operation of the slag and crucible dissolvers was satisfactory.

4. Schedule Variance

Redox production exceeded forecast by 24%. A sustained production rate of 11 tons uranium per day over the last seven days of the month established a new production record.

Production of the TBP Plant exceeded commitment by 4.2 percent. The UO_3 Plant commitment was exceeded by 60.6 percent. Ten carloads of UO_3 were shipped in August.

T Plant production exceeded forecast by 11%.

In Z Plant, production for the month of August was limited to 87% of the commitment. Although the production schedules were lower than the past three months and sufficient material was on hand to meet not only the commitment but the goal forecast, the high N/g/s count of the final product prevented meeting the monthly commitment.

B. Equipment Experience

1. Operating Continuity

Down time in Redox amounted to approximately 100 hours with the major cause being emergency shutdowns to unplug and flush the 1B to 1C column organic overflow line.

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1. Operating Continuity (Continued)

First cycle TBP was down 87 hours for flushing of column equipment. Second cycle lost 57.5 hours due to lack of feed as the result of first cycle outage.

Downtime in T Plant amounted to approximately 108 hours due to completion of a major overhaul of the 75 ton crane, regeneration and replacement of silver reactors, the installation of equipment to test a back-up silver reactor, and equipment repair and replacement of a minor nature.

As a result of the lowered production schedules there were no equipment failures which were sufficient to interfere with the continuity of operations in Z Plant during the month.

2. Inspection, Maintenance and Replacement

a. Cell Equipment Replacement - Redox

The first cycle feed pump (H-1 to F-7) failed after eight months service and was replaced. After the D-8 pump failed, a special test program was initiated to improve the Redox pump performance. Considerable time was spent in equipment flushings which were successful in removing plugs without replacing cell equipment.

b. 60 Ton Crane - Redox

The 10-ton hook of the canyon crane went out of control with a loaded bucket on August 26. Fortunately the crane operator was able to set the bucket on the dissolver top spilling only two slugs, which were retrieved with special tools. The crane was checked out electrically and mechanically without being able to duplicate the unusual conditions observed at the time of the incident. Other work completed on the crane this month included repairs to the charging wrench limit switches and the right hand optic.

c. Pulse Generator Equipment - Metal Recovery

The problem involving extensive difficulties in pulse generator equipment reported last month has been corrected. Equipment to provide simulated run-ins of these equipment pieces under maximum operating conditions was established in the canyon. One pulse generator was overhauled and tested this month and is being held as a spare. Simulated testing of all pulse generators held in standby will henceforth be standard procedure prior to replacement use.

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d. Task I and II - Metal Fabrication

Maintenance experience in Task I was confined to alterations in the equipment to permit greater insurance against critical concentrations of process material. An improved type off-gas line of Hastalloy C was installed in Task II where maintenance has been concerned primarily with improving the vacuum of the furnaces.

C. Improvement Experience

1. Process Tests and Revisions

a. Iodine Emission

Redox

Iodine emissions in excess of one curie/day occurred on four days during the period. It has been quite reliably established that these emissions occurred during the coating removal operation or during the period just prior to coating removal when the charge is being held in sodium nitrate solution. It has been largely concluded that three types of iodine emissions can be encountered. These include:

- 1) Emissions prior to coating removal while holding in sodium nitrate. These may be due to the chloride or iodate content of the sodium nitrate.
- 2) Emissions during coating removal. These may be caused by the presence of NH_3 , H_2 , etc. or the delayed effect of item 1.
- 3) Emissions during dissolution. These are possible as a result of process variables being out of control (i.e. temp-vacuum) or to depletion of the free silver on the reactor.

Procedural changes which have been made to provide better control of iodine, especially in respect to item 1 above, include:

- 1) Dissolver heels are held in rinse water rather than sodium nitrate until charging is ready to start.
- 2) Minimum temperatures and minimum sparging action have been adopted during holding periods.
- 3) Following the charging operation the nitrate solution is "neutralized" with 100 pounds of 50% caustic and the temperature maintained at 25 C until charging is ready to start.

T Plant

Piping changes were made to operate two existing silver reactors in series in order to determine the efficiency and operating

T Plant (Continued)

characteristics of a back-up silver reactor. The test was conducted in an attempt to evaluate this method as a means of controlling I^{131} emission from the dissolvers.

During the tests the back-up reactor released essentially insignificant amounts of I^{131} , and on the basis of the somewhat limited data it has been concluded that two heater silver reactor units in series can be used to control the I^{131} emission from the dissolvers. Further testing will be made after the installation of a permanent back up unit in one dissolver cell. A complete tabulation of the data supporting the conclusions is being issued in a formal document.

b. Waste Scavenging

No improvement in waste scavenging occurred this month although some favorable information was obtained. Normal scavenging continued until August 26 when in-plant scavenging tests were conducted using strontium nitrate instead of calcium nitrate as a carrier precipitant. These tests showed improvements in strontium and cesium precipitation by a factor of two to three times experience. On this basis a plant scale treatment was initiated and equivalent wastes to fill one full waste tank will be treated.

The thirteenth (13 - 107-BY) tank of scavenged waste was filled August 5. It is expected that this can be cribbed. Soil column tests are being made to determine the soil retention characteristics of the cesium and strontium activity. The fourteenth (14 - 108-BY) tank of scavenged waste was filled August 24.

2. Inventions and Discoveries

A report of invention is being prepared describing a Specific Depth Sampler for Liquids, which was conceived by R. C. Hubbard, M-1442-6414.

D. Events Influencing Costs

The August, Separations Section manufacturing cost is expected to be approximately ten percent above the July level. This increase in cost reflects the high level of production, and corresponding increase in essential material consumption, achieved by Redox, T Plant and TBP during the month of August.

E. Plant Development and Expansion

1. Project Status

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a. CA-513-A - Purex

Construction status at month end is 99.9 percent complete. Revision of the project proposal requesting three million dollars of additional funds to attain the 2.75 capacity factor was approved, authorizing immediate expenditure of \$1,500,000. Additional details and justification for an additional 40 ton remote crane was requested by the Commission.

Revision of the product removal facilities by Plant forces is approximately 40 percent complete.

With the calibration of M-1 and M-2 tanks in the decontamination and storage cell this phase of pre-startup plant modification was concluded.

Initial vessel and equipment system operability is complete. It is anticipated that additional operability tests will be performed after installation of equipment required to obtain the 2.75 capacity factor.

Balancing of the canyon ventilation system was completed, however some modifications will be made to improve the over-all system. Based on poor decontamination of the zirconium and niobium in the pre-cycle and partition sections, revisions to the HA and LA extraction columns are necessary. To gain the desired additional seven foot height in the scrub section of these columns it will be necessary to lower the columns approximately $4\frac{1}{2}$ feet below the existing cell floor. At the same time, revision to approximately 40 jumpers will be necessary to compensate for changes in elevation of the two columns.

b. CG-598-A - Purex

The Lummus Company approved and returned the contract for fabrication of the vacuum acid fractionator. Construction of the fractionator building addition to the 202-A Building is approximately 26 percent complete.

The General Electric portion of the project is 99.9 percent complete.

c. CG-613 - UO₂ Expansion

A total of \$3,000,000 has been authorized to date, however a re-estimate of the total project cost is being prepared and it is expected that the total cost may exceed \$3,800,000. Work on Phase I (footings and pads) is progressing satisfactorily, although one week behind schedule. This slight delay is not expected to delay the Phase II (building, some piping, filters) portions scheduled to start September 15.

d. CG-535-- Redox

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Operability tests have been completed, and the silica gel bed has been pretreated. Except for a weight recording instrument which has been returned to the manufacturer for recalibration, the Silica Gel facility is ready to operate.

e. CG-603 - 4X Program

The rehabilitation program is progressing satisfactorily with the B Plant portion of Project CG-603 estimated to be 80% complete. The acceptance tests at 224-B building are about 80% complete and Minor Construction's work in the building is scheduled to be finished during September.

Since the cancellation of overtime premium payments, the beneficial use date for the B Plant portion of CG-603 has been set back to December 31, 1955.

2. Plant Engineering

a. Standards

The essential materials standard for T Plant was developed from the revised chemical flowsheet. The labor standard for the 234-5 Operations Unit was completed, and the revised analytical service standards for the UO₃, TBP and T Plants were issued.

b. Work Simplification

The fourth series of Work Simplification, consisting of four conference groups scheduled to include A-B-C-D shift workers, will start September 16th. Revision of the subject matter for the course continued on schedule and is 60% complete.

c. Preventive Maintenance

The program of preventive maintenance for Separations Section is being developed and installed in Redox by members of the Industrial Engineering Unit. Kardex cards have been completed for all equipment in the system. Duties of clerical position have been determined and a man was obtained to fill the opening. Most of the preparatory work for the installation of daily time reports from craftsmen has been completed.

One man from Z Plant and two men from Purex were assigned during the month to install this preventive maintenance system in their plants. Assistance has been extended in training those individuals and in checking their work. Considerable progress has been made in Purex and Z Plant in the listing of equipment for the files.

DECLASSIFIEDd. Engineering Assistance1) Cask Car Study

The lid modifications to cask car 3643 are expected to be complete and the car ready for testing by the end of September.

2) Pressure Vessel Inspection

A Traveler's Insurance Company Representative made boiler and pressure vessel inspections of four boilers, the HF storage tank at the T Plant, and miscellaneous tanks and vessels in the 234-5 Building. All vessels inspected at this time were found in good condition.

3) Design - Drafting

Progress continues on the over-all as-built drafting program. Items completed included the gate lock electrical controls for the 202-A railroad tunnel, 221-T canyon trench piping diagram, 224-U calcining pot agitator, 202-S agitator lubrication facilities, and 202-S auxiliary charging hook.

Scoping layouts were made for 234-5 building compressed air system alterations, a shield wall to protect 272-U personnel from radiation, and a proposed stairway ventilation facility for the 202-S crane maintenance viewing room.

4) Purex Ventilation

The intermediate phase of the final ventilation balance of the Purex facility was completed by the Minneapolis-Honeywell contractors. All data and records have been reviewed by the General Engineering Unit, Ventilation-Balance Group to determine conformance to design specifications. The final trim balance is scheduled to be started by the Ventilation-Balance Group during September.

F. Reports Issued1. Routine

<u>Number</u>	<u>Subject</u>	<u>Author</u>
HW-38913	Separations Section Redox Plant Sub-Section Monthly Report - August 1955	R.T. Jessen
HW-38775	Separations Section Metal Recovery Sub- Section Monthly Report - August 1955	T. Prudich
HW-38923	Separations Section T Plant Sub-Section Monthly Report - August 1955	C.T. Groswith
HW-38892	Separations Section Z Plant Sub-Section Monthly Report - August 1955	W.N. Mobley

1. Routine (Continued)

<u>Number</u>	<u>Subject</u>	<u>Author</u>
HW-38886	Separations Section Analytical Control Sub-Section Monthly Report - August 1955	L.M. Knights
HW-38901	Separations Section Radiation Monitoring Sub-Section Monthly Report - August 1955	A.R. Keene
HW-38878	Separations Section Projects & Personnel Development Sub-Section Monthly Report August 1955	O.V. Smiset
Official Use Only	Separations Section Power & Maintenance Sub-Section Monthly Report - August 1955	C.P. Cabell
HW-38898	Separations Section Purex Sub-Section Monthly Report - August 1955	V.R. Chapman
None	Status of Projects, Informal Requests, and Budget Items, August 1955	R.M. Shervem
HW-38486	Essential Materials Consumption for T Plant - July 1955	M.A. Thress
HW-38487	Essential Materials Consumption for TBP Plant - July 1955	M.A. Thress
HW-38488	Essential Materials Consumption for Redox Plant - July 1955	M.A. Thress
HW-38489	Essential Materials ordered August 1 - August 31, 1955	D.E. Peterson
HW-38490	Essential Material Area Report to Cost and Purchasing, July 1 through July 31, 1955	M.A. Thress
HW-38401	Separations Section Waste Status Summary, for July 1955	D.E. Peterson
HW-38317	Analytical Control Quality Report	D.T. Crawley, Jr.

2. Non-Routine

HW-38814	Radiation Incident, Class I, No. 499-C	F.E. Owen
HW-38712	Radiation Incident, Class I, No. 498-C	W.G. Westover
HW-38340-RD	Processing Problems - TBP Plant June 14 to July 16, 1955	R.B. Abrams
None	Redox Improvement Program	R.T. Jessen
HW-38493-RD	Essential Material Standard for T Plant	R.H. Silletto
HW-38746-RD	Labor Standard for the 234-5 Operations Unit	V.P. Madsen and R.H. Silletto
None	Standard Analytical Service for the UO ₂ Plant	R.H. Silletto
None	Standard Analytical Service for the 221-U Building	R.H. Silletto
None	Standard Analytical Service for T Plant	R.H. Silletto
None	Separations Section-Annual Landlord Report - FY 1955	R.M. Shervem
HW-38781	History of Separations Plants Capacities	B.F. Campbell

III PERSONNELA. 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	219	223	/ 4
Metal Recovery Plant Sub-Section	263	255	- 8
Z Plant Sub-Section	182	183	/ 1
T Plant Sub-Section	216	216	0
Purex Plant Sub-Section	281	284	/ 3
Power & Maintenance Sub-Section	319	316	- 3
Projects & Personnel Development	59	61	/ 2
Analytical Control Sub-Section	205	206	/ 1
Radiation Monitoring Sub-Section	<u>166</u>	<u>162</u>	- 4
Section Total	1911	1907	- 4

B. Safety Experience

There were no major or sub-major injuries in the Separations Section in August. At the close of the month, both 200 Areas had operated 672 days without a lost time injury, an outstanding achievement since it involves approximately 8,700,000 exposure man hours.

C. Radiation Experience

Two Class I Radiation incidents occurred and included: (1) uncontrolled exposure up to 500 mrad/hr to two pipefitters from an overflow of process material in the 112 BY sluice pit (No. 498-C); (2) preliminary bioassay results indicate a minor quantity of plutonium deposition to a 234-5 laboratory assistant when she sustained a minor injury from a broken piece of contaminated glassware.

D. Personnel Activities1. Personnel Programs and Training

During the month the training program activities were as follows:

<u>Program</u>	<u>Attendance</u>
For Exempt Roll:	
Non-Exempt Rating Plan	42
For Non-Exempt Roll:	
GE Selection Program	9 (2 P&M, 2 Anal., 5 Operations)
Nine-Week Inst. Training	8

1. Personnel Programs and Training (Continued)

<u>Program</u>	<u>Attendance</u>
For Non-Exempt Roll:	
New Employee Orientation	11
Films "Its Everybody's Business" and "Freedom and Power"	900
"Ramset" Tool Training	52

2. Visitations

A. Brunstad attended the symposium on X-ray Analysis sponsored by the Denver Research Institute, University of Denver on August 11 and 12, and discussed analytical problems at Rocky Flats on August 15 and 16.

Edward Fredericks, ORNL, visited the Analytical Sub-Section on August 5 to discuss analytical problems.

G. O. Scukenbrocher and J. W. Robinson, from the Frenault Plant of the National Lead Company visited the 222-S Laboratory on August 16 to observe X-ray and spectrophotometric analytical methods.

3. Public Relations

J. H. Warren presented a talk entitled "Hanford Atomic Products Operation" to three organizations during the month of August. These were given to the Junior Chamber of Commerce on August 5 and to the Rotary Club on August 9 in Goldsboro, N. C. On August 12 the talk was presented to the Cinton Club of Greensboro, N. C. In each case the picture "A is for Atom" was shown.

During the past month six plastic suits requested through the AEC by the U.S. Information Service of the U.S. State Department were shipped from the Z Plant Sub-Section. Three of the suits were for display at the Geneva Atoms For Peace Conference. Two others were shipped to Japan and one to Pakistan.

One talk on the subject "The Future of Plastics in Contamination Control" was presented on August 30 by H. A. Moulthrop before the Richland Naval Reserve Unit.

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HW-38828

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September 8, 1955

ELECTRICAL UTILITY SECTION

MONTHLY REPORT

August, 1955

I. RESPONSIBILITY

The responsibility for routine patrol and maintenance of an additional 1.5 miles of the Taunton 115-KV transmission line was assumed in August by the Section when the AEC defined the government's ownership of the line as extending to structure No. 834 at the project boundary.

II. ACHIEVEMENT

A. Operating Experience

Power Statistics (See last page for details)

Plant Contract

Probable time of August Peak . . .	3:30 - 4:00 p.m., August 25, 1955
Telemetered Peak demand for August	174,000 KW
Probable energy consumption for August	109,038 MWH
Billing demand for August.	178,000 KW
Actual BPA Metered demand for July	166,944 KW
Actual energy consumption for July	106,391 MWH
Actual Cost of purchased electricity for July. .	\$258,544

* * * *

At 8:02 a.m., August 20, 1955, the Midway-Bonneville #1 line relayed and reclosed from unknown cause. The resultant surge on the system caused 105-KW to scram due to loss of power on the 4160 V. "C" bus. Associated relays had improperly tripped incoming circuit breakers.

* * * *

At 12:45 a.m., August 21, 1955, system frequency rose to 60.52 cycles, becoming normal again ten minutes later. The cause was due to separation of the Montana portion of the BPA System.

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HW-38828 **DEL**

The shift in frequency initiated the malfunction of frequency sensing relays in 100-KV causing separation of the 13.8 KV system from the vital portions of the 4160 V. buses. Subsequent malfunctions of other relays and equipment in the 4160 V. system caused total loss of power to that section shortly after. Restoration was partially made within the following hour.

* * * *

System frequency dropped to 59.66 cycles at 1:27 p.m. on August 11, due to the British Columbia Power separating from the BPA System. Frequency was restored to normal in four minutes with no adverse effect on HAPD.

* * * *

Power to the 66 KV bus at Hanford substation was tripped off by differential relay actions at 6:04 a.m., August 1. Service was restored at 8:08 a.m. A physical inspection of the station and lines produced no evidence to reveal the cause of the trouble.

The 125 KV supply breaker #174, which had blown its control fuses rather than trip on the above fault, was found to have a fouled mechanism due to mice and sand entering the control cabinet which was relocated during the 1948 flood and has been receiving minimum alterations and maintenance. In changing the control wiring to seal the cabinet, Hanford substation power was interrupted for five minutes at 12:43 p.m. on August 31.

* * * *

B. Equipment Experiences

The three 230 KV oil circuit breakers in the 151-B substation were overhauled during the scheduled area shut-down. As previously done in B Area on similar type breakers, fiber interrupter buffer rings were installed in place of the neoprene rings which have been found to be deteriorating rapidly. Oxidation of the breaker contacts, previously indicated by high resistance readings taken during routine testing, was found and removed by sanding. Modified linkage and valves, furnished by the manufacturer, for modernization of the operating mechanisms on these breakers could not be installed due to the reduced expected area outage time and priority of the other work. This will be scheduled and accomplished during an area shut-down at a later date.

* * * *

Preventive maintenance testing revealed a defective 230 KV bushing on breaker A-325 at 100-B. A spare was installed and the faulty bushing was returned to the G.E. factory for repair at their expense.

This is the third incident of insulating material breaking down on this type bushing. The failing condition was detected from voltage checks at the capacitance tap on the bushing while energized at 230 KV. In each of the three cases, the voltage reading was above that designated by the manufacturer as a safe operating level. Routine power factor tests had also indicated an undesirable trend. Eleven additional G.E. bushings of this type are being closely observed and tested.

* * * *

D. Events Influencing Costs

A program of excessing inventory surplus materials and transferring spare parts to the custody of Stores Sub-section has reduced the Section controlled inventories from \$31,000 to approximately \$11,000 during the past three months.

* * * *

A Stockroom Keeper "C" was released by transfer as a result of reductions in Section controlled inventories.

* * * *

Overtime hours expended were approximately 3.9% of the total regular hours worked.

Attendance for the month was 98.73%.

* * * *

E. Plant Development and Expansion

Four new cubicles were set in place in the 151-B-C substation during the month. These and four additional cubicles will serve new circuits to the 190-B Building required for the CG-558 project.

* * * *

Line and substation foremen offices, crew quarters, supplies, and tools were moved into the new Section consolidated headquarters in the 2101-M Building during the month.

* * * *

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DEL

Section representatives inspected the BPA Snohomish-Blaine 230 KV transmission line on August 22 and 23. The purpose was to appraise the installation and investigate the operating experience of this line which is H-frame construction utilizing wood poles and aluminum crossarms. The applicability of aluminum channel members as replacements for wood crossarms in our 230 KV line structures is being investigated and BPA's experience was found very promising

* * * *

Engineers of the Section, the Engineering Department, and EPA men in Portland on August 24 through August 26, to make analyzer board tests of the BPA and EAPC electric systems. Electrical characteristics and factors which will relate to our system after the completion of the CG-558 project were set up in order to determine operating problems we will encounter and the effect of our reactive power supply upon the BPA system.

* * * *

The imposed fault tests on the 13.8/4.16 KV systems at 100-KE and 100-KW, and on the 230 KV system are scheduled for September 20, 27, and 28, respectively. The 100-K testing procedures used will be fundamentally the same as followed on the May 2, 1955, tests staged at 100-KE. The 230 KV test procedure will be the same as that proposed earlier.

* * * *

F. Significant Reports

"Use of Aluminum Crossarms on Snohomish-Blaine 230 KV Transmission Line," by L. H. Eolien.

III. ORGANIZATION AND PERSONNEL

A. Organization

No changes in structure or nomenclature.

B. Force Summary

	Beginning	End	Net Change
Exempt Personnel	17	17	0
Dispatchers	5	5	0
Electricians	11	11	0
Linemen	22	21	-1
Substation Operators	31	32	+1
Secretary	1	1	0
Stenographer	1	1	0
Clerk	1	1	0
Storekeeper	1	0	-1
Draftsman	1	1	0
	<u>91</u>	<u>90</u>	<u>-1</u>

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HW-38828

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One lineman terminated during the month; storekeeper transferred to Stores Sub-section; and one substation operator hired in during the month.

C. Safety Experience

There were four minor injuries reported during the month, one of which was sustained by an operator when he slipped on a length of pipe left by a workman. This injury ended the Substation Operating group's record run of thirty-one injury-free months, totaling over 166,000 manhours of work.

D. Radiation Experience

No incidents were reported during the month.

E. Personnel Activities

E. F. Fitzmaurice, as speaker at the Section monthly informative meeting, spoke on the forthcoming union contracts and presented an effectual review of the Bacon-Davis Act's origin and experience.

* * * *

L. H. Holden and R. J. Agen inspected the BPA transmission line out of Blaine, Washington, on August 22 and 23.

* * * *

R. F. Haynes went to Portland for analyzer board tests of HAPC electrical system on August 24 - 26.

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ELECTRICAL UTILITY SECTION

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DEL

POWER STATISTICS
ELECTRICAL UTILITY SECTION
FOR MONTH ENDING AUGUST 31, 1955

	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)	26160	29080	47400	47600	74.2	82.1
A-4 Out (100-D)	12940	16400	25700	27900	67.7	79.0
A-5 Out (100-H)	10080	8040	14700	15200	92.1	71.1
A-6 Out (100-F)	7600	7380	13300	13400	76.8	74.0
A-7 Out (100-KW)	19344	17856	45000	33000	57.8	72.7
A-8 Out (200 Area)	6010	6250	10500	10100	76.9	83.2
A-9 Out (100-KE)	21600	19968	31000	35000	93.6	76.7
TOTAL OUT	103734	104974	187600*	182200*	--	--
MIDWAY IN	105148	106386	164000	169600	86.2	84.3
115 KV System (300 Area)						
BB3-S4 Out	2352	2512	4280	4400	73.9	76.7
115-66 KV System						
B9-S11 Out (100-K)	--	--	--	--	--	--
B7-S10 Out (W. Bluffs)	135	132	540	473	33.6	37.4
Hanford Out (7200 V.)	26	27	--	--	--	--
Hanford In	138	140	700	700	26.5	26.9
Project Total In	107638	109038	168980*	174700*	--	--

* Denotes Non-Coincidental Demand

Average Power Factor - 230 KV System 86.3

MANUFACTURING DEPARTMENT
PURCHASING AND STORES SECTION
MONTHLY REPORT AUGUST, 1955

I Responsibility - No change

II Achievement

STATISTICS

	<u>June</u>	<u>July</u>	<u>August</u>	<u>FY 1955 Average</u>
<u>Purchasing Sub-Section</u>				
<u>Emergency requisitions received*</u>				
Employee & Public Relations	8	5	6	3
Engineering	32	32	48	24
Manufacturing	76	45	81	59
Medical	6	4	5	6
Minor Construction	238	166	144	166
Radiological Sciences	7	6	5	4
Stores	92	104	92	104
Total	459	362	381	366
Average per day	20.9	13.1	16.6	17.4

*Data available for 6 months only in FY 1955

<u>Total requisitions**</u>				
On hand start of month	1,039	1,094	1,056	902
Received	3,173	2,797	2,673	2,591
Placed	3,118	2,835	2,885	2,590
On hand end of month	1,094	1,056	844	903

**Do not include those assigned to AEC, Viz:	596	313	320	493
--	-----	-----	-----	-----

<u>Number of purchase orders placed</u>				
General Supplies Unit	1,950	1,738	1,970	Breakdown
Process Equipment Unit	615	525	583	Not
Essential Material Unit	35	28	26	Available
Local Purchase	76	53	86	
Total	2,676	2,394	2,665	2,299

<u>Value of purchase orders placed</u>				
General Supplies Unit	\$ 592,101	\$ 496,497	\$ 591,257	Breakdown
Process Equipment Unit	813,211	901,986	1,139,566	Not
Essential Material Unit	783,669	605,501	562,409	Available
Local Purchase	473	423	668	
Total	\$2,189,454	\$2,004,407	\$2,293,900	\$2,019,885

<u>Purchase order alterations</u>				
Number	186	201	297	181
Gross value	\$ 100,837	\$ 98,495	\$ 211,160	\$ 98,771

II Achievement - (Cont.)

Purchasing Sub-Section (Cont.)

	<u>June</u>	<u>July</u>	<u>August</u>	<u>FY 1955 Average</u>
<u>Expediting*</u>				
Orders on hand start of month	2,547	2,803	2,846	2,379
Orders received	2,865	2,396	2,569	2,305
Orders completed	2,609	2,353	2,634	2,246
Orders on hand end of month	2,803	2,846	2,731	2,438

*Data available for 8 months only in FY 1955

Stores Sub-Section

General Supplies

Store orders processed	29,719	27,053	25,279	23,734
Value of issues	\$ 330,939	\$ 285,597	\$ 279,273	\$ 313,691
Line items in account	30,057	30,041	30,164	23,734
Back orders on hand	330	303	355	338
Out of stock items	217	154	131	204
Percent of line items out of stock	.7	.5	.6	.7

Spare Parts

Store orders processed	2,116	1,211	1,439	1,472
Value of issues	\$ 150,942	\$ 62,319	\$ 102,433	\$ 101,233
Line items in account	29,332	29,530	29,803	25,975
Back orders on hand	239	219	306	294
Out of stock items	224	332	231	251
Percent of line items out of stock	.8	1.1	.8	1.0

Receiving

Shipments received	7,167	5,319	7,174	6,667
Receiving reports issued	6,963	6,075	6,965	5,877

Excess Material & Equipment

Received	\$ 104,060	\$ 123,643	\$ 232,249	\$ 146,722
Issues to Project	4,785	3,206	2,778	36,282
Shipped off-Project	225,037	109,807	13,915	356,009

Revenue from scrap and surplus sales

\$ 38,237	\$ 4,765	\$ -	\$ 21,090
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Requisitions screened

3,023	2,470	2,611	2,831
-------	-------	-------	-------

Items screened

8,122	7,132	7,634	8,554
-------	-------	-------	-------

Items furnished

934	935	808	424
-----	-----	-----	-----

Traffic

Savings

Rate reductions	\$ 2,985	\$ 3,659	\$ 4,384	\$ 3,184
Freight bill audit	4,184	3,380	664	1,836

Savings since - September 1, 1946 to date \$ 1,964,256

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HW 388200EL

MONTHLY REPORT
HANFORD ATOMIC PRODUCTS OPERATION

AUGUST 1955

GENERAL SUMMARY

PRODUCTION OPERATION

The inventory of acceptable canned slugs was reduced to less than a one week supply because of heavy reactor discharges and low production yields. The bare slug inventory was maintained at approximately 1-1/2 weeks supply.

Starting August 18, after completion of minor repairs to the Redox plant, the 1S and 1A columns were operated in parallel. By August 25, a production rate of 11 tons per day had been achieved, and this rate was continued for the balance of the month.

ENGINEERING TECHNOLOGY

Total design for Project CG-558, Reactor Plant Modification for Increased Production, advanced to 91% complete.

A relationship was observed between absolute humidity at FMPC, hydroxyl content of the heat treating bath, hydrogen content of the heat treated uranium, and porosity (and/or void) rejects of lead-dip canned slugs. Further analysis indicates that, if the hydroxyl content of the heat treating bath is kept below one percent, the rejects for braze porosity should be less than two percent.

Based on poor decontamination in the scrub sections of the HA and 1A columns, in the Purex Plant, the recommendation was made that their lengths be increased by at least 7 feet and that anti-backmixing caps be installed just above the feed point. Recent cold and hot semi-works studies are confirming the need for such a plant change. Specifications for lengthening the Purex column scrub sections were provided.

PERSONNEL & SERVICES

The first fatality in Operations activities occurred August 31, 1955, as a result of an explosion in the 300 Area.

In view of recent Congressional action with respect to expenditures for construction projects, the General Electric Company now has a responsibility as a prime contractor to continually review the status and availability of funds for projects on which it performs management or architect-engineer-management services.

Temperature changes in the Columbia River have been found to be more responsive to solar heat on the McNary impoundment than to Hanford effluents.

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II Achievement - (Cont.)

Traffic (Cont.)

	June	July	August	FY 1955 Average
Money recovered - Claims				
Loss, damage & overcharge	\$ 158	\$ 1,363	\$ 200	\$ 494
Ticket refunds	203	321	1,592	603

Money recovered - September 1, 1946 to date \$296,893

Work Volume

Travel requests	116	94	136	141
Reservations made	249	251	417	424
Expense accounts checked	244	183	165	202
Shipments traced	161	33	119	71
Quotations furnished				
rates and routes	653	568	677	531
Freight bills approved	1,722	1,163	1,797	1,522
Amounts*	\$ 383,509	\$ 187,268	\$ 311,753	\$ 323,155
Carload shipments received	1,090	505	946	950

*Data available for 7 months only in FY 1955

The distribution of the Central Safety Council Award to HAPCO employees on August 26, 1955 was completed as scheduled.

Meetings between Financial and Stores personnel were held to lay the ground work for taking the annual physical inventory of General Supplies which is scheduled for September 29 and 30, 1955.

During the month, conversion of Stores General Supplies Caption 6 to the standard stock numbering system, Class 45, Electrical Supplies was completed. New catalogues have been distributed through the plant and September 1, 1955 established as the effective date of this change. Including the foregoing a total of twenty five classes have been established during this program. Currently the following two classes have not been converted to the new system.

Class 26 - Electronic Supplies
Class 24 - Hospital Supplies &
Surgical Apparatus

The volume of incoming excess, salvage and scrap materials showed a substantial increase over the previous month as 246 documents covering 1281 items were received compared with 130 documents covering 970 items received in July. Indications are that this upward trend will continue for the next two months.

Of the two surplus and scrap sales completed this month, the largest covered the old Transportation facilities in the 1131 Bus Yard. One sale remains open.

Effective August 29, 1955 the PBX type of telephone service was discontinued at Central Stores in favor of direct lines. This is made possible by the increased number of plant telephone lines resulting from the recent separation of plant and community telephone system. This change will improve Stores service by offering more expedient and satisfactory communication.

A survey of Stores employees disclosed that all personnel who operate government vehicles have a valid AEC operator's permit.

II Achievement - (Cont.)

Two buildings located at the north end of Stores Yard No. 2 (Excess) were transferred to the Army on August 10, 1955. In connection with this transfer of property, the Army relocated the fence and moved the north entrance gate to the west boundary fence in front of Building 15 along Stevens Drive.

A report covering Stores landlord activities for FY 1955 was prepared and issued. Landlord expenses for FY 1955 totaled \$65,695; a decrease of \$8,320 or 11% less than the previous year's costs due largely to the reduction in the size of the excess yard and number of buildings retained.

Meetings were held on August 17 and 18 with AEC, General Electric, and Service Metal Fabricator personnel to discuss this vendor's claim on order AEC 6685 for an In-line Alpha Monitor. Through joint negotiations settlement of this \$18,000 claim was made for \$7,500; thus terminating a controversy which has extended over several months.

Status of Contracts

Liquid Carbon Dioxide - Contract RO-5, Sup. 1, with Cascade Fire Equipment Corporation has been completed and is in force.

Liquid Carbon Dioxide - Contract RO-20, with Cascade also, has been sent to A.E.C. for approval.

Tributyl Phosphate - Contract RO-19 with Westvaco has been completed and is in force.

Chlorine - Invitations to bid on our requirements for the year November 1, 1955 through October 31, 1956 will be mailed soon.

Caustic Soda - Field estimates of consumption are being secured now for the period January 1, 1956 through December 31, 1956, preparatory to mailing of Invitations to Bid.

IBM Equipment - Contract SO-2, Supplement No. 2, is now in full force, extending the contract to June 30, 1956 and increasing the maximum rental to \$433,000.

Safety Shoes - Contract RO-22 with Lehigh Safety Shoe Company is being referred to A.E.C. on Record of Purchase for approval.

July's report stated that perforated aluminum dummies formed by a new process were being tested. These tests have now been declared satisfactory and a requisition has been written to cover a quantity of 100,000 dummies. The estimated savings on each will be \$0.20, or a total of \$20,000 on this lot. This saving is a result of market research activity in the Essential Materials Unit, as the search for less expensive sources of supply is continued.

Through negotiations with the rail carriers, effective October 15 the rate on Naphtha Distillate from Borger, Texas to the Project will be reduced approximately \$.16 cwt. which will effect a savings of approximately \$85.00 per car.

A saving of \$539.16 in freight costs was effected on a carload shipment of Turco cleaning compound. This was accomplished by persuading the users to accept a carload shipment in lieu of separate shipments scheduled over a three month period.

III Organization and Personnel

Force Summary

<u>Component</u>	<u>7-31-55</u>			<u>8-31-55</u>			<u>Change</u>		
	<u>Ex.</u>	<u>N.Ex.</u>	<u>T</u>	<u>Ex.</u>	<u>N.Ex.</u>	<u>T.</u>	<u>Ex.</u>	<u>N.Ex.</u>	<u>T</u>
General	3	4	7	3	3	6	-	(1)	(1)
Traffic	3	6	9	3	6	9	-	-	-
Purchasing Sub-Section	43	54	97	43	54	97	-	-	-
Stores Sub-Section	12	157	169	12	160	172	-	3	3
Total	61	221	282	61	223	284	-	2	2

Safety Experience

A committee has been established to develop Job Hazard Breakdowns for hazardous jobs in Stores. The JHB's will be prepared based on visual analyses and consultations with employees engaged in various jobs and will be used as training and job performance guides.

There were five minor injuries and one sub-major injury reported. The sub-major injury resulted when a wire around a bundle of two inch pipe broke during a loading operation permitting the pipe to tumble onto the truck bed. The employee's fingers on his left hand were caught between the pipe and the edge of a 55 gallon drum which was already loaded.

Six safety meetings were held with a total of 210 employees attending.

Radiation Experience

Receiving employees who are subject to exposure from incoming radioactive shipments have been supplied with radiation meters and badges. A procedure has been developed by Radiation Monitoring Unit to control the issuance and pickup of badges and meters. This procedure was placed in effect on August 29, 1955.

Personnel Activities

J. R. Kelly, Engineering Specialist, is in Trenton, New Jersey and Everett, Massachusetts as contract administrator for order HWC 7077 with DeLaval Steam Turbine Company. As such he is representing Purchasing and at the same time handling engineering and inspection liaison on this very critical order which covers pumps for Project CG-558.

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TRANSPORTATION SECTION
MONTHLY REPORT
August 1955

Transportation Section personnel forces decreased from 489 to 436 by three new hires, four transfers in, one reactivation - personal illness, two terminations, seven transfers out, and two deactivations - personal illness.

Transportation Section expenditures totaled \$2,328,945 for the first seven months of the calendar year and are down \$53,363 or 2.24% over the same period in 1954. The following indicates comparative costs by major service functions:

<u>Function</u>	<u>CY 1955</u> <u>1st 7 mos.</u>	<u>CY 1954</u> <u>1st 7 mos.</u>	<u>% of</u> <u>Variance</u>
Railroad	\$ 424,357	\$ 440,148	- 3.59 %
Plant Bus	793,682	778,469	+ 1.95 %
Heavy Equipment Maintenance	349,470	361,130	- 3.23 %
Light Equipment Maintenance	372,324	422,574	- 11.89 %
Road Maintenance	48,645	84,966	- 42.75 % *

* Reduction is partially distorted by recorded seal coating expenditures of only \$8,220 in July 1955 compared to \$23,002 in July 1954.

Transportation Section costs for FY 1956 have been estimated at \$4,294,552 which is 3.89% below the budget and 5.70% above FY 1955 actual. Listed below are unit cost performance bogeys for FY 1956 compared with FY 1955 actual.

	<u>FY 1956</u> <u>Bogey</u>	<u>FY 1955</u> <u>Actual</u>
<u>Railroad</u>		
Cost per railroad car handled - Commercial	\$ 29.73	\$ 31.46
Process	232.40	241.89
Average	52.34	52.97
<u>Plant Bus</u>		
Cost per mile - Operating	.4173	.4043
Maintenance	.1281	.1268
Total	.5454	.5311
<u>Light Equipment</u>		
Cost per mile - Maintenance	.0689	.0614
<u>Road Maintenance</u>		
Cost per mile - Maintenance	\$ 317.74	\$ 250.67
(primary roads based on 20' roadway seal coating not included)		
Seal Coating - per square yard for surfaced areas	.1108	.1134
<u>Track Maintenance</u>		
Cost per mile	2,577.18	2,698.82

Transportation Section

The annual physical inventory of railroad materials (0420-934) has been satisfactorily completed. This account contains 261 line items having a total value of \$60,961. The physical inventory exceeded the book value by \$2,126 or 3.61% compared to 4.41% in 1954. Incorrect processing of credit store orders was responsible for 88% of the overage. The final status report set forth the reasons for the high number of months supply on hand and the low rate of turnover.

Collaborated with the Financial Department in the development of a more practical system for charging the cost of chauffeur service to customer organizations. Approximately 25 routine work orders will now provide full coverage where 110 routine and several additional non-routine work orders were formerly used.

Furnished the Commission with a detailed listing of accident damage repairs during FY 1955 for the Annual Motor Vehicle Report. Damages totaled \$11,088.12 of which \$2,006.26 were recoverable. Copies of the listing were transmitted to principal equipment users to focus attention on the problem and solicit their assistance toward corrective measures.

Expanded the system for accumulating and liquidating landlord expenditures in the 600 Area to cover Riverland, 3000 Area Equipment Storage Yard, and the Unassigned Service Area. The annual landlord reports for these locations and the Consolidated Transportation Facility have been prepared and forwarded for departmental consolidation. Expenditures totaled \$95,746 during FY 1955.

Completed financial and procedural arrangements for the overhaul of construction equipment. Received authorization from the Engineering Department to commence work on the initial three units. It now appears that this program will be less than had been anticipated since several units are expected to be available by upgrade from other AEC installations.

Developed procedures and arranged for civil defense funds to maintain thirty White buses in the AEC Contingency Pool for the emergency evacuation of schools in Richland. Work has begun on these units in order to have them fully operational by September 15. Maintenance requirements will be similar to those accorded to the Area evacuation fleet.

The use of assigned sedans for transportation between Richland and the outer areas has been reduced about 60%. Primary resultant changes to date are an increase in bus patronage, decrease in gasoline consumption, and fewer lubrication jobs required with a greater percent of the service being performed in the area garages. Department Managers are being furnished a weekly traffic report as to date, vehicle number, driver, arrival time, reason for trip, etc. Arrangements have been completed whereby vehicles driven from the outer areas may be left in the 700 Area Motor Pool for overnight parking whenever the reason for the trip involves a 700 Area location.

Commercial rail traffic during August increased approximately 50% over July as normal coal receipts were resumed following the miners' annual holiday. The following recapitulation indicates the distribution of commercial cars handled:

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Transportation Section

<u>Carload Movements</u>	<u>-</u>	<u>Loads In</u>	<u>Empties In</u>	<u>Loads Out</u>	<u>Empties Out</u>
General Electric Company		975	24	13	977
Atomic Energy Commission		0	0	0	1
Foster Sheet Metal		1	0	0	1
L. H. Hoffman Co.		7	0	0	6
The Bay Company		0	0	0	1
The Tide Company		1	0	0	1
U. S. Army		<u>58</u>	<u>0</u>	<u>0</u>	<u>57</u>
		1,042	24	13	1,044

Railroad process service during August continued below normal because of production difficulties, and decreased 3% over July following a 12.4% reduction in July over June.

Railroad car movements consisting of process, commercial, and special service totaled 2,424 in August compared to 1,631 in July, 2,673 in June, 2,843 in May, 2,463 in April, 2,106 in March, 2,354 in February, and 2,288 in January.

Completed major overhaul of locomotive 39-3729 on August 16.

Reviewed the stock of railroad equipment parts. Excessing of obsolescent and overstocked items will reduce the inventory by about \$1,650.

Routine maintenance of Plant railroad trackage during August required 6,577 man-hours. Installed 331 rails between May Junction and Edna as a part of the annual relay program.

The Plant Bus System transported 21.18% more passengers in August than in July because of the greater number of week days in the reporting period and additional passengers for a full month from the restricted use of sedans between Richland and the outer areas. The following statistics indicate the magnitude of service rendered:

Passenger Volume	172,783
Revenue - Bus Fares	\$ 8,639.17
Earnings - Transit Advertising (July)	\$ 105.39
Bus Trips	7,089
Bus Miles - Passenger Carrying	201,378
Passenger Miles	5,678,390

The Richland Bus System transported 13% more passengers in August than in July which was unusually low. The following statistics indicate the volume of service rendered:

Total Passengers Including Transfers	5,889
Revenue - Bus Fares	\$ 401.61
Earnings - Transit Advertising (July)	\$ 4.79
Bus Trips	1,101
Bus Miles - Passenger Carrying	5,835
Passenger Miles	15,417

Transportation Section

Our Plant unaffaired automobile trips (Company business and/or official matters) totaled 199 which were rendered to the following locations:

AEC Airport	1
Benton City, Washington	20
Enterprise, Washington	3
Grandview, Washington	3
Hinkle, Oregon	3
Kennewick, Washington	68
Kiona, Washington	2
Pasco, Washington	40
Pendleton, Oregon	11
Prosser, Washington	5
Richland Y, Washington	1
Spokane, Washington	1
Sunnyside, Washington	12
West Richland, Washington	15
Yakima, Washington	8

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	72,505	14,715	11,200	2,980	291
R. Used During Month	88,089	18,300	32,765	2,470	0
Disbursed During Month	84,944	17,735	30,415	1,035	66
Stock at End of Month	75,650	15,280	13,550	4,415	225

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

Motor Overhauls	45
Class A Inspections and Repairs	57
Class B Inspections and Lubrications	1124
Weekly Inspections - Fuel Trucks and Off Plant Vehicles	20
Semimonthly Inspections - Buses	175
Front End Alignment and Wheel Balance	125
Monthly Inspections - Railroad Rolling Stock	15
Routine Maintenance Repairs and Service Calls	1937
Accident Repairs and Faint Jobs	30
Tire Repairs	667
Wash Jobs	<u>442</u>
	4,638

Considerable emphasis was placed on processing new equipment and this caused some deferment in Class A Inspections. Eighty-five of the 100 new pickups and 39 of the 43 new sedans have been assigned. All new equipment should be serviced by September 15.

Special efforts are being made toward the excessing of 125 replaced units by September 9, 1955 as requested by the Commission.

Transportation Section

Twenty-one units of contaminated HO equipment were cleaned during the month at the 269-W Building, 200-West Area.

Completed revisions to the front wheel brakes on the 62 older General Motors coaches and arranged with the Commission to procure a premium type lining on a no substitute basis.

Began the installation of hot water heaters for improved windshield defrosting in the 62 older General Motors coaches.

Completed the replacement of unsatisfactory carbon tetrachloride fire extinguishers with four pound powder type units in all buses assigned to the Plant and Richland Bus Systems.

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	391	455,957
1B	Buses	92	207,660
1C	Pickups	535	213,073
1D	Panel, Carryall, Sta. Wagon	158	111,844
1G	Jeeps	3	1,294
1H	Power Wagons	50	20,198
68 Series	Trucks	224	80,458
		<u>1,453</u>	<u>1,090,484</u>

Covering of the Redox railroad cut embankment to control contamination is approximately 70% complete as 4,000 cubic yards of ballast were hauled and placed during the month.

Seal coated an additional 18.3 miles of Plant roads requiring 66,000 gallons of asphaltic material and 2,600 cubic yards of mineral aggregate. The annual program of 35 miles is approximately 85% complete.

Maintenance of Plant roads and the production of road aggregate material required 1,192 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	32.33	283.07
Received During Month	38.74	155.50
Used During Month	58	421.36
Stock at End of Month	13.07	17.21

The following tabulation indicates the volume of mineral aggregate and pre-mix material handled in July for road maintenance:

	<u>3/4" to 0</u>	<u>1/4" to 0</u>	<u>5/8"</u>	<u>1/4"</u>	<u>3/4"</u>
	<u>Pre-mix</u>	<u>Pre-mix</u>	<u>Chips</u>	<u>Crushed</u>	<u>Crushed</u>
	<u>Tons</u>	<u>Tons</u>	<u>Cu.Yd.</u>	<u>Rock</u>	<u>Rock</u>
				<u>Cu.Yd.</u>	<u>Cu.Yd.</u>
Stock at Start of Month	622	560	5,062	422	3,174
Made During Month	759	565	0	0	0
Used During Month	601	219	4,188	408	486
Stock at End of Month	780	906	874	14	2,688

ENGINEERING DEPARTMENTAUGUST 1955FILE TECHNOLOGY SECTION

Analysis of the remaining graphite samples exposed in the pile to 75 percent CO₂ - 25 percent CO showed a burnout rate of 0.3 percent per 1000 days at ambient pile temperatures. This is 1/3 the steady state rate observed for samples exposed to 95 percent CO₂ - 5 percent CO in the same test.

An estimate of the condition of the pile process tubes in the older reactors, B, C, D, DR, H, and F Piles, based on a recent correlation of tube corrosion rates with outlet water temperatures has been completed. It was recommended that the reactors continue to operate at their present bulk outlet water temperatures. With tube replacement based on a calculated minimum residual wall thickness of 0.025 inch, operation in this manner will require replacement at D and F reactors of up to 50 tubes per month within the next six months. In addition, it will be necessary to immediately replace approximately seventy of the most severely corroded tubes at D reactor. In all of the older reactors approximately 1000 tubes will have to be replaced in the next year.

Reactor theory was improved by the formulation of a new method to calculate the resonance escape probability in lattices. The equations developed are much easier to use and are more accurate than existing equations.

One each of the three most promising types of I&E wafer slugs will be charged into the MTR on September 12 for five, three week periods. Power level in the block will be 80 to 90 KW/ft. and exposure, approximately 200 MWD/T per period. The slugs are to be measured after the 1st and 3rd period, and returned to HAPO after the 5th.

A relationship was observed between absolute humidity at FMPC, hydroxyl content of the heat treating bath, hydrogen content of the heat treated uranium, and porosity (and/or void) rejects of lead-dip canned slugs. Further analysis indicates that, if the hydroxyl content of the heat treating bath is kept below one percent, the rejects for braze porosity should be less than two percent.

Heat treating by the vertical induction method reduced the total hydrogen content of the uranium by 35 to 75 percent in initial test runs. Also, as measured by the Sonic Orientation Tester, a more random orientation was indicated in the induction heat treated material than in salt bath heat treated material.

A study of the uranium pickling procedure in the 303 Area showed that the spray process was unsatisfactory. The nitrous acid, a catalyst for the etching of uranium, is removed by the spray. A pilot plant to study the details of the process has been installed. The results of this study will be helpful in redesigning the apparatus.

A study of the reaction kinetics between hot (300 C) water and uranium metal, heated 300-400 C above water temperature has been initiated. In the initial experiment with the high pressure loop facility, bare uranium heated to 660 C was allowed to react with water heated to 280 C flowing past the specimen with a velocity of approximately 16 feet per second. At the instant of reaction, pressure in the loop increased from 1575 psi to 2050 psi. Automatic shutdown of the loop and failure of a valve gasket were the only adverse effects noted. No shock wave was generated. The specimen was in contact with water initially at 280 C and cooled to a final temperature of 65 C during a period of 15 hours. The specimen was intact and had suffered a weight loss of 8.9% after removal of the oxide film.

SEPARATIONS TECHNOLOGY SECTION

Detailed run plans for testing the Purex plant with cold uranium and plutonium have been issued to Manufacturing Department.

At T Plant, two silver reactors in series demonstrated a high removal efficiency, with the back-up unit removing greater than 98% of the iodine passing through the first unit.

The process performance of Recuplex was highly satisfactory throughout the month.

Based on poor decontamination in the scrub sections of the Purex HA and IA columns, the recommendation was made that their lengths be increased by at least 7 feet and that anti-backmixing caps be installed just above the feed point. Recent cold and hot semi-works studies are confirming the need for such a plant change. Specifications for lengthening the Purex column scrub sections were provided.

It has been determined that for an expenditure of 5-10 million dollars for dissolving facilities, about 200 t/yr of less than 2% enriched power reactor fuels could be processed in the Redox plant for less than \$1.50 per pound.

An explosion of a salt bath furnace in 328 Bldg. resulted in a fatality on August 31, 1955. The cause of the explosion has been attributed to the reaction which resulted when cyanide base salts were being placed in a hot crucible which had previously contained salts with a nitrate-nitrite base. Precautions to be observed and procedures to be followed in the operation of salt bath furnaces are being reviewed and revised if necessary in order to preclude any future accidents of this nature.

DESIGN SECTION

Design Section effort on the 4-X Program and Reactor Plant Modifications for Increased Production continued to decrease as these programs neared completion. Customer work showed a corresponding increase in terms of Section effort. Distribution by major component is as follows:

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Percent of Total Effort

Design Development	37.6
4-X Program	11.7
Reactor Plant Modifications for Increased Production	9.9
Purex Modifications	5.3
Other Design Projects	16.5
Customer Work and Miscellaneous	19.0

Total design for Project CG-558, Reactor Plant Modification for Increased Production, advanced to 91% complete.

Authorization was received during the month from HOO-AEC for CA-513-E, Expansion of 200 Area Facilities. Proposed items excluded from this authorization included silica-gel facilities, back-up iodine removal facilities and a second remote crane for Purex. Project proposals requesting authorization for these items are being prepared. Design was started during the latter part of the month on (1) Iodine Monitoring Facilities, (2) Continuous Sampling Facilities, and (3) Waste Storage Tank Circulators. Requisitions were prepared for advance procurement of critical material.

Major reactor design development items in progress during August included feasibility studies of power generation from high temperature reactor effluent water, basic design criteria for a supplementary production reactor, study of pressurization of existing reactors as a means for increasing irradiation capacity, zone temperature monitoring for existing reactors, and continuous charge-discharge for 100-C and 100-K reactors.

Work was completed on the study of a continuous dissolving facility to supplant existing Redox Plant dissolvers. Preliminary scope studies for new integrated plutonium separations facilities continued. Existing separations plants design development items included liquid circulators for underground waste storage tanks, Phase II capacity increase for Redox, decontamination of off-standard TBP product, and back-up iodine removal facilities for Purex.

PROJECT SECTION

At the end of the month the completion status of major construction 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	100%	100% ¹
	1706 KER Recirculation Facilities		14%
CA-513-A	Purex Facilities, Part A	100%	100%
CA-539	Additional Waste Storage Facilities, Redox	76%	82%
CA-546	Fuel Element Pilot Plant	70%	70%
CG-558	Reactor Plant Modifications, Phase I	15%	22%
CG-603	Hanford 4X Program, Bismuth Phosphate Plants	77%	77%
CG-613	Hanford 4X Program, Metal Conversion Plant		2.5

1 Complete except for start-up and clean-up items.

ORGANIZATION AND PERSONNEL

Total on Roll August 1, 1955	1,437
Net Change	+5

Total on Roll August 31, 1955	1,442
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Effective August 31, 1955, five Design Section engineers transferred to the Commonwealth Edison Project.

A. B. GRENINGER, MANAGER
ENGINEERING DEPARTMENT

ENGINEERING ADMINISTRATION SECTIONAUGUST 1955

The replacement of old and little used offsite reports in Classified Files by Microcards has begun. The early Chicago reports in the CB series have been reviewed and 96 microcards ordered. A microcard reader (Kodograph Microprint Reader, Model A) which has been highly recommended by a number of other AEC sites has been ordered and if satisfactory, a unit will be placed in each Extension File. The review of early offsite reports has also indicated that it may be desirable to eliminate all copies of certain offsite reports (the Chicago CA series, for example, which deals with administrative matters) having little or no technical value today.

A draft of a "HAPO Security Classification Guide" was issued during the month as HW-37965 DR. Three copies were sent to the local AEC for transmittal to the AEC Office of Classification in Washington. Copies were distributed for comment to (1) Section Managers in the Engineering and Manufacturing Departments, and (2) the Director of the Radiological Sciences Department. To date no adverse comments have been received.

During the month further information was received concerning the contribution expected from Hanford in the Civilian Applications Program. In a letter dated August 10, the Manager of HOO requested that additional copies of reports be prepared as follows: (1) 300 extra copies of each CONFIDENTIAL Research and Development report, (2) 100 extra copies of each SECRET Research and Development report, and (3) 300 copies of all new unclassified Research and Development reports.

A statistical procedure for analyzing run to rupture tests involving two metal types has existed for some time. However, it often happens in present production tests that more than two metal types are involved. In order to provide a valid analysis for this situation, the statistical theory involved here has been developed and reported in an unclassified paper, "Life Testing - m Populations." A secret document, HW-38780, dated August 25, 1955, "Statistical Analysis of Run to Rupture Tests When More Than Two Metal Types Are Involved," was written based on the statistics of this paper.

During the month the following major contract activities were handled:

1. Special Agreement No. G-68 between General Electric and Industrial X-Ray Engineers was signed by the Contractor on August 1.
2. Special Agreement No. G-67 between General Electric and the Tri-City Herald was executed by the parties on July 15.
3. Modification No. 2 to Special Agreement No. G-26 between General Electric and General Telephone Directory Company providing for the reduction in the number of copies in the fourth edition and an extension of the term of the agreement was signed by the Contractor on August 19.

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4. Modification No. 2 to Special Agreement No. G-31 between General Electric and Abadan-Spokane providing for an extension of the agreement was signed by the Contractor on August 10.
5. Consultant Agreement No. G-127 between General Electric and Harrison G. Gough, Ph. D., providing for consultant services relating to certain psychological tests of General Electric personnel was signed by the Consultant on August 10.
6. Special Agreement No. G-71 between General Electric and Future Farmers of America, Inc., providing for the exchange of sheep for experimental purposes by General Electric, was signed by the Contractor on August 29.
7. Modification No. 1 to Consultant Agreement No. 125 between General Electric and Booz, Allen & Hamilton providing for an increase in the scope of work, additional payment and an extension of time was executed by the Consultant on August 26.

R. J. SCHIER, MANAGER
ENGINEERING ADMINISTRATION SECTION

FILE TECHNOLOGY SECTION

MONTHLY REPORT

AUGUST, 1955

VISITORS & TRIPS

R. O. Bolt, California Research Company, visited HAP0, August 8-9, to discuss gamma facilities on the AT-11-1-174.

T. E. Fisher, KAPL, visited HAP0 regarding hot lab application, inspection of facilities and exchange of information on metallurgical fuel elements, August 15-19.

J. P. Frankel, consultant, Northwestern University, Evanston, Illinois, spent August 15-19 at HAP0.

E. Frederick, ORNL, visited HAP0, August 4-5, to inspect radiometallurgy facilities and analytical control facilities.

Thomas Neville, KAPL, visited HAP0 to discuss KAPL-120, August 8-20.

M. J. Ryan, UCRL, Livermore, California, visited HAP0 regarding fabrication of parts, August 16.

R. H. Simon, GE-KAPL, visited HAP0 to discuss high temperature water technology and to discuss and observe KAPL-120 loop, August 17-18.

G. W. Watt, consultant, University of Texas, spent August 1-5 at HAP0.

J. A. Berberet and P. M. Jackson visited KAPL to discuss KAPL-120 loop, August 25-26.

J. H. Brown and D. C. Pound spent August 1-2 at ORNL and August 3-5 at BNL discussing assistance to Hanford.

R. O. Brugge spent August 1-2 at ORNL and August 4-5 at BNL discussing assistance to Hanford. He also presented a paper on Thorium at duPont-Wilmington, August 3.

S. H. Bush attended Metallurgy & Ceramics Professors' Conference at Research Laboratory, Schenectady, August 22-24; consulted on HAP0 assistance program at KAPL, August 23-24, and consulted on revision of Reactor Handbook at BMI, August 25.

J. J. Cadwell presented a paper at Metallurgy & Ceramics Professors' Conference at Research Laboratory, Schenectady, August 22-24, and consulted on HAPO assistance program at KAPL, August 23-24.

A. C. Callen presented a paper at the Thorium-U-233 Technical Information Meeting at Wilmington Area Office, August 3, and visited National Lead, Fernald, Ohio, August 4-5, regarding uranium fabrication.

W. V. Cummings attended the Fourth Annual Symposium - Industrial Applications of X-ray Analyses at Denver Research Institute, Denver, Colorado, August 11-12.

J. M. Davidson presented a technical paper at the meeting of the American Physical Society which was held in Mexico City, Mexico, August 29-31.

R. L. Dillon consulted with Kaiser Aluminum & Chemical, Spokane, Washington, August 11-12.

T. W. Evans and J. E. Minor inspected test specimens in the MTR at Phillips Petroleum, Idaho Falls, August 23-24.

J. M. Fouts and R. L. Reynolds visited Phillips Petroleum, Arco, Idaho, to inspect measuring device in their canal, August 22-23.

C. R. McNutt inspected facilities for HAPO high flux irradiation tests at the National Reactor Testing Station, Idaho Falls, Idaho, August 29.

L. G. Merker visited the Monarch Machine & Tool Company, Sidney, Ohio, to settle engineer changes on Monarch lathe, August 23-24.

H. Neumann attended the American Physical Society Meeting, Mexico City, Mexico, August 29-31.

W. J. Ozeroff spent August 4 at GE in Schenectady consulting on APED.

E. C. Pitzer visited KAPL regarding fuel elements, August 22-24.

O. W. Rathbun visited Mallinckrodt Chemical, St. Louis, to observe uranium fabrication processing relative to characteristics of slug cores received at HAPO, and National Lead at Fernald, Ohio, to observe uranium fabrication, August 1-5.

J. W. Riches visited Bridgeport Brass, Adrian, Michigan, August 8-12 to consult on uranium metallurgy, and August 21-26 regarding experimental fabrication of uranium.

W. P. Wallace visited Bridgeport Brass, Bridgeport, Connecticut, regarding zirconium, August 11-12 and August 26.

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File Technology Section

HW-38828

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ORGANIZATION & PERSONNEL

Personnel totals are as follow:

	<u>July 31</u>	<u>August 31</u>
Administrative	2	2
File Engineering	94	92
File Materials	60	60
Fuel Technology	117	121
Physics Research	42	41
Metallurgy Research	76	78
Contact Engineering	3	3
Technical Administration	<u>9</u>	<u>10</u>
Totals	403	407

File Engineering: D. E. Trott, Engineering Assistant, and J. M. Batch, Engineer I, were hired August 2; H. H. Greenfield and L. A. Wilson, Engineers II, terminated August 12; M. C. Green and C. W. Gillard, Engineers II, terminated August 19 and 31, respectively.

File Materials: R. D. Houston, Engineering Assistant, was hired on August 15 and B. L. Martin, Engineering Assistant (summer employee), terminated August 26.

Fuel Technology: L. R. Ferrill, J. W. Taylor and C. P. Ogsten, Engineering Assistants, were hired August 12, 22, and 30, respectively; H. J. Zuhr, Senior Engineer, transferred in from Major Appliances-Louisville, August 15; J. W. Finnigan, Engineer I, transferred in from Advance Engineering Section on August 1; L. V. McDaniel, Stenographer, transferred in from Office Auxiliaries Sub-Section on August 15; C. P. Teter, Steno-typist, was deactivated on August 19; E. A. Eschbach, Senior Engineer, transferred to Advance Engineering Section on August 1.

Physics Research: I. N. Sorrels, Engineering Assistant, was hired August 31; R. L. Wetherald, Engineering Assistant, transferred to Metallurgy Research Sub-Section on August 29; R. C. Moore, Jr., Engineer I (summer employee), terminated August 26.

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Metallurgy Research: R. L. Ring, Engineering Assistant, transferred in from Separations Technology Section, August 1; G. R. Monk, Engineering Assistant, transferred in from Manufacturing Department, August 15; F. E. Johnson, Tech Grad, was permanently assigned August 22; R. L. Wetherald, Engineering Assistant transferred in from Physics Research Sub-Section on August 29; L. P. Morgan, Engineer II, and Jack Washburn, Senior Scientist (summer employee) terminated August 26.

Technical Administration: E. F. Kurtz, Planner-Administrative Controls, transferred in from Separations Technology Section on August 1, 1955.

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FILE ENGINEERING SUB-SECTIONPROCESS TECHNOLOGYPower Level Limitations

The maximum operating power level, during August 1955, was limited by 105 C tube outlet temperatures at B, D, DR and F Piles, and 100 C at C Pile. At KE and KW Piles the power is limited to 500 KW/tube to prevent extensive damage to the reactor in the event of a sudden and complete loss of water to the tube. The tube outlet temperature limit at H Pile was increased from 100 C to 105 C after the installation of venturis, and a temporary relaxation of the graphite limit was effected which allowed operation at the tube outlet temperature limit. The tube outlet temperature limit at C Pile was increased to 105 C at month's end.

Process Specification Changes:

Temporary Relaxation of Specifications 31.01 b. and 41.01: - Specification 31.01 b. was relaxed to allow the use of 15 per cent more helium at the H Pile in 480 to 500 C temperature range, and specification 41.01 was relaxed to allow a maximum graphite temperature of 560 C within 1.5 lattice units of "C" columns at the H Pile.

Specification 16.00, "Water Supply During Shutdown Periods": - The allowable bulk water outlet temperature limit was increased from 92 to 95 C. A new individual tube limit based on electrical power failure to the 190 pumps has been specified and an automatic trip of the #1 safety circuit in the event of such a power failure is required. The operation of the crossunder lines and the high pressure cross-tie line at the K Piles has been specified. Requirements for shutdown water flow rates and water shutoff were added for the K Piles and water shutoff requirements for all piles were revised. The use of the ball 3X System in case of water supply failure and for a seismoscope trip at C and K Piles is now required. A requirement that the 190-105 water system be isolated into two parts when the crossheader check valves are in place was added.

Specification 14.00, "Purging During Reactor Operation": - This specification was deleted.

Specification 53.00, "Ball 3X System": - This is a new specification. It defines a serviceable ball 3X Unit.

Pile Operation

Since the startup from the venturi outage at H Pile, difficulty has been encountered with severe oscillation of the Panellit gauges. It has been found to be very difficult to throttle the sensing line enough to dampen the oscillation without completely closing the valve. A total of 15 Panellit scrams occurred in the first 13 days of operation since the venturi outage. Investigations are being conducted to determine if the oscillation is an actual pressure oscillation caused by the venturis or some form of harmonic amplification inherent in the new CG-558 Panellit gauges.

An electrical outage occurred at KW Pile in which the B.P.A. power supply to the primary pumps failed and emergency power supply did not properly function. Analysis of the incident by other organizations has revealed the difficulties to have been caused by (1) the presence of a closely set frequency trip on the Bonneville loop which caused the initial trip-out of water plant components, and (2) faulty equipment in the back-up system which prevented its operation. The difficulties have been corrected and tests have been conducted to check the operation of the electrical components. Operation at present is considered justified. A re-examination of the philosophy of the K backup system and consideration of the possibilities of modification is underway.

Process Tube Leaks

Process tube leaks at D and F Piles are continuing. At F Pile, two shutdowns for water leaks occurred, with a total of 12 process tubes requiring removal and replacements; seven leaks caused by internal and external tube corrosion, three leaks of Van Stone flanges and one leak caused by a ruptured slug. One leak was discovered after a chromic acid purge of headers 6 and 7.

At D Pile, four leaking process tubes caused by internal tube corrosion were replaced. The removal of all tubes with less than a calculated 25 mils of wall thickness remaining is planned.

KW Pile was completely pressure tested due to high water collection rates. No leaks were found except for several rear nozzles which required tightening. Water collection rates returned to normal after the outage, therefore it is possible that one or more of the loose nozzles was allowing water to enter the pile by leaking past the Van Stone flange.

Substitution of "E" Metal for "C" Metal

Studies have been completed which show that 0.9 per cent U-235 E Metal can be substituted for "C" metal in fringe enrichment tubes with considerable economic advantage. The conversion is now being planned and a production test is being prepared for the initial loadings of the E Metal.

Use of Depleted Metal in Hanford Piles

A study is nearing completion which discusses the use of 0.2 per cent and 0.3 per cent U-235 depleted uranium in Hanford Piles. The use of depleted metal in poison columns is shown to increase plutonium production and to provide increased flexibility as compared to 10-66 irradiation. It is suggested that the lost production by not using depleted uranium be used as a yardstick to measure the desirability of irradiating other special materials which absorb excess neutrons. The use of a fringe blanket of depleted uranium to reduce shield damage is also being evaluated.

Economic Goal Exposure

A study has been completed which shows that metal goal exposure in excess of 1000 MWD/ton is not optimum from an economic point of view due to a high rate of plutonium burnout at higher exposures. The optimum goal exposure depends on product worth.

A related study has been made to determine the economic losses incurred when metal is discharged at less than goal exposure. These losses are balanced against other operational losses for the following considerations:

- (1) Reduction of goal exposure due to high rupture rate
- (2) Early discharge of rupture prone lots of metal
- (3) Discharge of metal at less than goal exposure to make use of available shutdown time.

Blending of Enriched Metal and Low Goal Exposure Depleted Metal

A study is being conducted which shows large savings in metal processing costs can be achieved by blending irradiated enriched material with normal low goal exposure depleted metal to obtain uranium of natural U-235 concentration. Enriched metal, proposed as a substitute for "C" metal spike enrichment columns, could be a source of blending material, if irradiated to low goal exposure. One pound of 0.9 per cent enriched uranium irradiated to low g/T product would bring approximately six pounds of depleted uranium to the natural U-235 concentration. The use of non-irradiated "E" Metal for this purpose also appears economically attractive and consideration is being given to proposing the purchase of E Metal for blending until irradiated E Metal is available.

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>
105-570-A	Cored-Lead Dip	4	2-C	2 ruptures	discharged	ruptured at 1158 and 1173 MWD/T
			2-F	"	1490-1550	
	Control	4	2-C	"	1 discharged at 1046	1 ruptured at 1128 MWD/T
			2-F		1380-1420	
105-583-A	IQS-7	4	H	900	discharged	Ingots differ slightly from regular production ingots
105-581-A	IQS-8	6	H	900	"	
105-592-A	IQS-9	6	H	3-900, 3-600	"	
105-586-A	U-S1 Ingots	1	B	900	discharged at 1007 MWD/T	
	U-S1 Dingots	4		2 ruptures		not yet charged
	U-S1 Cored	3		900		not yet charged
	Control	4		2 ruptures		not yet charged
105-587-A	Internally and Externally	7	C	600	1 tube discharged at 135 MWD/T. Others not yet loaded.	Water temp. in core of discharged slugs was higher than predicted, indicating possible need for larger core.
105-588-A	Development test of Extruded and Drilled Cored Slugs	3 tubes 1-C per mo. 3-C 3-D		900 1100 900	discharged 470-500 560-580	ruptured at 797 MWD/T
						Charged 3-7-55. 1 rupt. at 174 MWD/T.
					420-460	Charged 3-30-55
					140-160	Charged 7-10-55
105-590-A	Extruded Cored	4	C	ruptures	not yet charged	Compares performance of extruded and drilled cored slugs

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Pile Engineering Sub-Section

HW-38828

DEL

105-591-A	Cored	Approx. 300 KE 209 D	900				Authorizes irradiation of production quantities of cored slug. 1 rupture at 505 MWD/T occurred at C. 1 rupture at 707 MWD/T occurred at C.
105-593-A	Cored-Al. end plugs	4 C	1-200 1-600 2-900		discharged at 213 370-390		
105-596-A	Dingot Slugs	9 F	2-300 2-600 5-900		discharged at 300 350-450	Slugs charged alternately with control slugs from rod-transformed and slug-transformed metal.	
105-597-A	Mg.-U Matrix 4" Slugs	1 B or D 1 B or D	3000 6000		not yet loaded not yet loaded	2 matrix slugs + 31 reg. slugs 10 enriched matrix and 12 normal matrix slugs	
105-601-A53-MT	Solid	12 D	6-600 6-900		approved	Delay of 30,43,50 and 80 seconds between salt bath and water quench.	
105-603-A47-MT	Cored-Crimped uranium end plugs	4 C	1-300 1-600 2-900			charged 8-25-55	
105-607-A57-MT	Cored-Enriched welded uranium and aluminum end plugs 3/8" and 5/8" core diameters.	6 C	ruptures		circulating for approval	Compares performance of welded uranium and aluminum end plugs and a larger core diameter.	
105-608-A56-MT	Dingot Slugs	16	7-600 9-900		approved	Compares various mechanical and heat treatments of Dingot uranium.	

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Pile Engineering Sub-Section

HW-38828

DEL

105-608-A56-MT Supp. A	Dingot Slugs	Both low and high goal	circulating for approval	Authorizes irradiation of production quantities of Dingot slugs		
105-608-A56-MT Supp. B	Dingot Slugs	8	C	ruptures	circulating for approval	Compares performance of dingot and ingot uranium slugs
105-610-A60-MT	Vertically Heat Treated 10 Uranium	2-400 4-600 4-900	circulating for approval	Rod heat treated in vertical position		
105-611-A	Regular Production	33	500 900 1100	circulating for approval	Investigates the effects of pile variables upon slug stability	

Ruptured Slugs

Sixteen slug failures occurred during the month. These consisted of 14 failures of regular production metal, one failure of an Al-U-235 alloy J piece and one failure of an Al-U-235 alloy "C" piece. The rupture experience for the month of August is summarized in Table I. Included in this tabulation are data for one failure which occurred on 7-27-55, after the Monthly Report for July had been written.

TABLE ISLUG RUPTURE EXPERIENCE - AUGUST 1955

Type of Metal	Tube No.	Failure Date	Exposure MWD/T	Failure Type
8" Normal U - "M" Lot	2972-F	7-27-55	673	Compound Cap
8" Normal U - "K" Lot	3376-D	8-5-55	909	Side
8" Normal U - "K" Lot	3578-D	8-5-55	911	Side
8" Normal U - "M" Lot	3081-F	8-7-55	374	Side
8" Normal U - "G" Lot	2372-F	8-7-55	738	Side
8" Normal U - "A" Lot	2967-F	8-7-55	711	Side
8" Normal U - "K" Lot	3884-C	8-10-55	92	Side
8" Drilled, Cored U - "D" Lot	3771-C	8-11-55	707	Split
8" Normal U - "K" Lot	2777-D	8-12-55	878	Cap
8" Normal U - "K" Lot	1966-F	8-13-55	696	Cap
Al-U-235 Alloy - "C" Slug	1393-C	8-14-55	108 MWD/ tube	Side (chatter)
Al-U-235 Alloy - "J" Slug	0582-DR	8-16-55	139 MWD/tube	
8" Normal U - "K" Lot	1773-DR	8-19-55	936	
8" Normal U - "N" Lot	3674-D	8-23-55	950	
8" Normal U - "L" Lot	0877-D	8-23-55	939	
8" Normal U - "K" Lot	3284-D	8-25-55		

The six pieces which failed at D Pile this month were all charged on 11-18-54. To date eight failures have occurred in the approximately 350 tubes which were charged on that date. These failures have shown a tendency to occur in the top, far quadrant of the pile as did the D Pile failures from the 12-12-54 charge. In both charges the failures were predominantly of the side failure type. At the present time, approximately 40 tubes from the 11-18-54 charge are under irradiation, about 60 having been discharged during the shutdown of 8-26-55. All remaining tubes with the exception of a few in the fringe areas are regularly scheduled for discharge in about a month.

HEAT TRANSFERSimulation of Transient Cases

Tests to study the effects of steam power loss at EDF reactors continued. Maximum outlet water temperatures for these tests ranged from about 130 to 135 C. Pile inlet orifices patterns were simulated to give nominal tube flows of 30.5 gpm (venturi zone), 26 gpm (0.269 single orifice), 20 gpm, 16 gpm and 12 gpm (double orifice combinations). Heat generation decay characteristics comparable to Borst-Wheeler relation or those more conservative were employed.

Results based on incomplete analysis indicate that a central zone tube with equilibrium outlet water temperatures of 130 C and 900 KW tube power can tolerate instantaneous 190 pump discharge pressure reduction to at least 240 psig. A drop to 225 or 230 psig may lead to uncontrolled flow decrease and possible slug damage. Tubes with nominal flows less than the venturi zone but at equilibrium outlet water temperature of 130 C can tolerate greater pressure decreases than for the central zone before uncontrolled flow decrease occurs.

Other transient tests were performed. These were (a) rapid cone screen plugging-- low trip of Panellit, (b) cone screen plugging - high trip of Panellit and (c) downstream plugging - high trip of Panellit. The technique did not permit full exploration of extremely severe cases due to probability of burnout of experimental apparatus. Equipment modification to enable better study of the extreme cases was initiated.

Cooling by Boiling Equipment Development

Minor Construction completed installation of the high pressure process tube modifications. All unfired pressure vessels were inspected for conformance with the ASME code by an inspector of Traveler's Insurance Co., in accord with provisions of OPG 14.10. The mock-up piping held satisfactorily in hydrostatic tests up to 2500 psi, with the exception of one valve having a defective body. The valve is not essential for forced circulation heat transfer experiments and a replacement is promised within three months.

The final components of the test section are being fabricated. Electrical installation is nearing completion. The process and heater tubes are available for installation. Several uniform 900 KW heater tubes were completed and further design was made for two types of cosine heater tubes.

Hydraulic Studies

A special venturi for use in the irradiation of I and E slugs in C Pile was calibrated, and assistance was rendered to the Special Irradiations Unit in calibrating temperature sensing elements for the same test. Elements provided initially were not satisfactory, and others were fabricated.

It was determined that severe plugging in Panellit sensing line front nozzle elbows can be tolerated without significant effect on the response characteristics of the gages. Assistance was rendered to Manufacturing personnel in tests to determine the nature of pressure impulses causing oscillation of the H Pile Panellit gages. Test apparatus is being arranged to determine the effect of damping devices on the response characteristics of the gages, being one phase of a larger program to define a course of action to cope with CG-558 Panellit gages.

Conditions causing cavitation flow in unloaded C Pile process tubes were determined as an aid to Design Section personnel engaged in studies of charge-discharge during operation apparatus.

Other Studies

A detailed examination was made of the causes and effects of loss of 4800 volt BPA supply to KW Pile on August 21. Several undesirable features of the installation are

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apparent. Upon loss of 4800 volt service, emergency lighting and instrument supply is poor and boiler auxiliaries cease functioning. Assistance was rendered to design personnel in planning desirable changes to the equipment and associated circuitry above and beyond those made prior to startup of the pile after the incident.

Assistance was rendered to Metallurgy Research personnel in devising procedures and equipment for determining the relationship between contact pressure, surface finish and contact thermal resistance of uranium. Heat conduction studies as services to others included determination of (1) temperatures in aluminum end plugs of cored slugs, (2) surface temperatures of C slugs with concentric band bond defects, (3) temperatures in special tensile specimens, (4) time-temperature characteristics of KAPL-120 loop tubes in event of water loss to loop, (5) equations relating to thermal characteristics of specimens at higher powers in the MTR, and (6) temperatures in I and E uranium wafer slugs.

PILE PHYSICS

Dry Lattice Moderator Coefficient vs. Exposure - Brookhaven

Discussions were held with Brookhaven personnel during the month by representatives from the Pile Physics and Physics Development Units concerning the dry lattice moderator coefficient of reactivity as a function of plutonium buildup. Whereas they had measured a strongly negative coefficient in raw uranium agreeing favorably with the Hanford K Pile dry test results, a preliminary analysis of Brookhaven data obtained during an annealing test indicated that the moderator coefficient had become slightly positive as a result of product buildup equivalent to 300 g/t; this result appears to confirm theoretical predictions made by Physics Research personnel which have serious nuclear safety implications in the event of loss of cooling water.

The data from an annealing test performed at approximately 250 g/t have been forwarded to Hanford for detailed analysis, the data from the 300 g/t annealing test is expected shortly, and plans have been made to follow closely another annealing experiment to be run at Brookhaven this Fall at which time their product buildup will correspond roughly to our 400 MWD/T material.

Possibilities for obtaining corresponding information were investigated at Oak Ridge; due to their low exposure goals, low power level, and meager operational data, however, the X-10 pile history does not appear to be significant in relation to the coefficient problem.

Wet Lattice Moderator Coefficient vs. Exposure Data - H Pile

A careful analysis was made of the H Pile data previously reported by Operational Physics and Physics Research personnel to be strong evidence for the postulated positive change in graphite reactivity coefficient with exposure. Reactivity transient data were obtained from two widely separated outages in which power level, temperature, time, and poison loading conditions were quite similar, but the residual product buildup in the pile was markedly different in the two cases. Although values obtained were somewhat different, the results of this analysis are qualitatively in agreement with those reported previously. An informal report of the detailed analysis will be issued in the near future.

PT 105-600-A Progress - KE Pile Graphite Coefficient

The 14 basic horizontal rod configurations employed during the first three He-CO₂ purge tests were successfully calibrated during the August 10-11 outage. Physics Development Unit personnel provided instrumentation for use in the series of low level pile period measurements.

Analysis of K Pile Startup Data

Continued effort was expended during the month on the detailed analysis and reporting of K Pile startup test data. Reactivity data obtained during the single column and 9-tube block tests have now been analyzed. The report on the natural uranium critical loading determinations is now in rough draft form.

Shield Masonite Deterioration Studies

A comprehensive summary was completed during the month of the studies carried out on radiation and thermal damage to shield masonite, on the relation between operating conditions and masonite burnout, and on anticipated shield radiation leakage as a function of masonite burnout; this paper is currently in the process of publication as a formal report, HW-35202. An informal report will be issued shortly for local distribution relating predicted shield leakage rates directly to pile power levels.

Shield Concrete Attenuation Studies

Attenuation measurements are now in progress on iron-limonite concrete slabs which had been heated to 320 C for about two months. Measurements at the time the slabs were removed from the oven indicated no further loss in weight since they had completed an oven exposure at 177 C.

PHYSICS DEVELOPMENTPrototype Physical Constants Test Reactor

All major components for the prototype Physical Constants Test Reactor have been installed and successfully performance tested except a portion of the safety circuit which is currently undergoing test. All fuel for the reactor has been fabricated with about half the driver element loading required for criticality currently on site; it is expected that the complete order from Metals and Controls will be available at the month's end.

The complete reactor facilities will be turned over to Physics Research for operation following a critical review of component performance test results on the mechanical, electrical and instrumentation systems early next month.

Gamma Monitor Project - CG-578

The initial on-pile installation of gamma spectrometer units as replacements for beta sensitive instrumentation in the slug rupture detection application was completed at H Pile. The system has functioned satisfactorily with experience thus far disclosing no "bugs". The installation of similar systems at the remaining piles, except KE and KW, will follow at approximately two month intervals.

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Reactor Safety - Nuclear Instrumentation

The mechanical design for the mechanism to remotely position a U-235 fission counter in a process tube as part of a pile sub-critical neutron multiplication detector has been completed by Mechanical Equipment Development Unit; the entire unit will be ready for installation in D Pile by the end of September for in-pile testing to provide Operations with experience in utilizing this type of installation. Discussions with Manufacturing resulted in agreement that a project would be initiated immediately to install the sub-critical monitor in all piles. Concurrently, a program to determine the improvement possible to attain in the performance of the BF_3 proportional counter systems will be carried forward at D Pile. The proportional counting systems are the primary low level startup instruments at all piles and will revert to the status of backup or supplementary systems following the projected fission counter installations.

The components for the process tube ion chambers which will serve as detectors for the B, D, and F Pile octant monitor systems have been fabricated. An experimental installation is scheduled to be made in F Pile during October.

General Plant Assistance

The rate at which a cluster of SAR type fuel elements will generate power when irradiated in a specified geometry in the KAPL-120 loop at H Pile was determined approximately through neutron distribution measurements in the Test Pile. The fuel cluster, consisting of seven twisted ribbons - 0.85 grams U-235 per inch of ribbon, was irradiated in a side test hole within an exterior housing reportedly the same as that to be used at H Pile. Crude analytical corrections were applied to correct the results to (1) the neutron temperatures to be experienced at H Pile, and (2) an expanded cluster of 19 elements. The results are believed to be conservative and indicate that the power generation rate should not exceed 150 KW for a single 32" fuel cluster irradiation or 230 KW when two clusters are irradiated simultaneously.

Neutron absorbing splines, i.e., cadmium or boron contained in metallic strips, which can be inserted between a slug train and process tube wall potentially offer one of the most economical and flexible ways of increasing the capacity of the 105 pile control systems. However, this method of control may introduce substantial thermal cycling in the uranium column as the poison is introduced or removed during operation. Neutron traverses were made in an assembly mocked up in the Test Pile to yield the distribution of fissions (specific power generation rate) in a slug with a half inch spline directly beneath. The fission distribution in the top half of the cylindrical slug is but slightly affected by the presence of the local poison with the neutron intensity at the slug surface decreased about 10 per cent. The fission distributions in the bottom half are markedly depressed, as would be expected. These data will be used to calculate thermal and stress gradients.

Lattice Neutron Economy

Experimental determinations of the dependence of the effective cross section of thorium for capture of neutrons at resonance energies upon the geometry of the thorium element as expressed by the surface to mass ratio have been completed. The

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dependence is very non-linear but the effective resonance integral for slugs of Hanford dimensions can be linearly approximated as a tangent to the true curve and gives $8(1 + 3.48 S/M)$ barns where S/M is the ratio of surface area to mass. An approximate calculation yields 4.6 barns for the effective volume integral.

Studies are underway to determine the neutron economy of a reactor loading utilizing discrete enriched uranium slugs as the fuel for tritium production. Empirical relationships giving lattice disadvantage factors as a function of slug blackness are currently being determined to refine the area of largest uncertainty in this work.

Approximate distributions of fissions have been determined along several radii of a slug which received an 850 MWD/T irradiation and which was selected for radial sampling and determination of the abundances of the uranium and plutonium isotopes along a diameter in a joint Hanford and KAPL program. The distributions along some diameters are very assymetrical and it is questionable that the joint programs should proceed on this slug. Authorization to substitute another slug from the recently irradiated "Bluenose" channel is being requested.

Test Pile - Routine Tests

The testing of uranium slugs proceeded routinely with the exception of one lot of bare cored slugs which retained salt from the heat treating bath. Nine lots of Mallinckrodt billet eggs yielded TDS values ranging from 11 to 19 and 15 lots of Fernald billet eggs yielded TDS values ranging from 12 to 18. Routine tests on thorium and aluminum proceeded routinely.

Test Pile - Special Tests

Several 8 inch cobalt-aluminum slugs were tested to determine the effectiveness in poison column application. The results are as follows:

<u>Grams Cobalt per 8 inch slug</u>	<u>Inhours per full column in the center of the unflattened pile</u>	
	<u>K</u>	<u>Other Piles</u>
148	14	26
293	22	41
406	25	47
553	28	53

MECHANICAL EQUIPMENT DEVELOPMENT

Charging and Discharging Studies

A test is being arranged to determine the effect of washing an entire tube charge through the ball valve from a long straight tubular magazine. Flow rates and slug damage will be measured, and the amount of cocking determined by X-ray. One of the new BDF type charging machines will be available for use as a control.

Vertical Rod Studies

Final report on the functional test of 105 K type rods has been issued as document HW-38779.

Document HW-38628 was issued covering the operational test of the K Pile 3X tie-in switch. An improved type of tie-in switch is also described.

Work is continuing toward developing a satisfactory latching arrangement for use with an accelerated type vertical safety rod.

Supplemental Control

Development efforts on poison splines have been restricted by higher priority work. A Confidential-Unclassified letter was issued covering Ball 3X drop time tests through B,D,F,DR, and H systems.

Disaster Control

Document HW-38579, "Evaluation of Proposed Disaster Control Systems" was issued 8-10-55. Studies are continuing on rate and quantity of fission activity which would be released under various conditions together with measures to be taken to confine contamination.

Process Assembly and Piping

A design for a stub sectional gunbarrel has been prepared to simplify rear face work during tube removal, as a less costly alternative to the complete re-nozzling which would be required for a current proposal for O-ring seals of process tubes. Sample components are being fabricated.

High Pressure-High Temperature Loop

High pressure-high temperature loop installation has been shutdown because of failure of part of the heating section. This will be replaced by a taller section of stainless steel, which should give better convection circulation.

Flanging of Zircaloy-2 Tubing

Van Stone flanges can now be produced on annealed Zircaloy-2 tubing by progressively rolling a wider angled flare. The present stepwise rolling tools will be replaced by a continuously advancing roller on the production model equipment. Salt bath annealing shows greatest promise of success on a production basis since it requires only to dip the tubing in the melt for 90 seconds, followed by a cold water quench.

Physical Constants Test Reactor

Assembly and testing of all mechanical components is complete except for the source mechanism. All mechanical work and a document covering engineering test data will be completed in early September.

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Sub-Critical Counter Positioning Device

Prototype components are being assembled in 189-D and will be demonstrated in the 9-tube graphite mockup.

SPECIAL IRRADIATIONS

KAPL 120 Loop

Construction of the KAPL 120 loop has been completed. The loop has been running on recirculation in the out-of-pile portion of the equipment. The loop was started on recirculation through the pile tube on August 22. It was planned to stay on recirculation until the next scheduled outage, however, instrument troubles forced the loop to go on process water on August 23 just before pile startup. At present, the instrumentation is being revised to alleviate these troubles.

Discussions are being held between KAPL and Hanford on the final design of the fuel element assembly to go in the loop. It is hoped the design will be firmed up by the week starting August 29.

With the exception of certain vendor furnished items, a gamma monitoring and recording system has been assembled to monitor activity at four points in the loop. Vendor furnished equipment is ordered and delivery is expected in a few days.

A sample of the P-13 in-pile tube has been shipped to KAPL for examination in their Radiometallurgy Laboratory.

In-Pile Irradiations

Tests have been completed on the control instrumentation in support of the irradiation of graphite under controlled temperature conditions (HAPO-124). Charging of the experiment is contingent upon the sponsor's schedule.

Controlling equipment designed to compare in-pile damage to graphite to that exposed to identical conditions but with the absence of pile radiations (HAPO-148) has been installed on the -9' level at 105 C. Installation of minor service facilities is required before out pile runs can be started.

Mock-up studies of the I and E slug monitoring assemblies (HAPO-159) indicated that reliable data could not be obtained primarily due to the peculiar flow stream in the vicinity of the bore thermocouples. A redesign, fabrication, and procurement are essentially complete. Mock-up tests of the new trains are expected to be complete by the end of August.

Annular uranium slugs for use with the NAA safety fuse assemblies (HAPO 162) have been shipped to the NAA Laboratory. It is intended that a Hanford representative will be at NAA when the in-pile trains are assembled.

Small uranium samples prepared for low temperature, low flux irradiation with carefully controlled integrated flux (HAPO-108 and 145) have not yet been installed. An attempt was made to charge a portion of the samples during August, however, vacation conflicts with B Pile outage dates interfered with the charging.

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Two experimental assemblies for studying zirconium gas reactions (HAPO-105) are nearing completion. Charge goal is the first F Pile shutdown in September.

The irradiation of two groups of slug size pieces containing shaped natural uranium designed to study changes in physical properties under irradiation was completed during the month. The third group of samples continue to be irradiated. Exposure goals of the first two groups were achieved with considerable accuracy at C Pile.

An experiment to study the diffusion of Krypton gas within uranium metal (HAPO-166) is being designed. The volume of the diffused gas is to be measured by counting induced activity. Sample design and production test preparation are underway.

A series of irradiations designed to examine the effect of pile irradiations upon the tensile strength of nickel and nickel-iron bonds between aluminum and uranium (HAPO-165) are being studied. Present schedule calls for samples being available by mid-October. A rough draft production test is being prepared.

A feasibility study for providing instrumentation to measure several transient variables during pile scrams has been completed. The measurement of these variables requires the use of high speed recording equipment as done with multi-channel oscillographs utilizing light sensitive photo film. A rough estimate of cost has been prepared based upon the feasibility study.

Irradiation of Cobalt

Comments from Manufacturing Process Sub-Section resulting from the study as to the estimated production potential of Cobalt 60 in HAPO reactors have been received. The comments are being studied and a report for submission to the Brookhaven National Laboratory is being prepared. 305 Pile studies to determine the poison value of various Cobalt loadings have been completed. The primary objective was to produce a Cobalt slug with a reactivity value equal to a Mint piece. Preliminary results indicate that such a slug 8" long and containing 553 grams of Cobalt will satisfy the conditions.

Gamma Sources

Accommodation of a joint proposal from the Air Force and the California Research Corporation to gamma irradiate hydraulic oil, lubricants, and jet fuel will require a considerable extension of the present facilities. A cluster facility to utilize irradiated enriched fuel slugs as sources has been designed. A preliminary cost estimate for fabrication of the extended facilities and their installation has been completed.

Future plans are to replace the enriched sources with Cobalt sources, thus eliminating the need for frequent re-loading of sources as well as simplifying the dosimetry calculations.

Neutron Studies

Calibration of the standard Co-Al monitor foil is nearing completion. All necessary irradiations have been completed. Analytical results should be available several days subsequent to completion of the counting work.

Revision of the Special Irradiations Manual sections on neutron flux and exposure has been drafted. Illustrations for these sections are being prepared by Graphics Unit.

Process Assistance

A spare 16 point multi-switch such as is used with the water monitor Beckman in the K Piles, has been completely disassembled, modified and re-assembled in an effort to improve the switch operation and provide instructions for better switch maintenance. Other modifications are indicated as a result of this investigation and the work is continuing.

Facilities

The design of all Snout shielding equipment proposed for installation at 105 KW is complete. The three cask sections are out on inquiry bid. Cost estimates for the complete shielding facility should be available by mid-September.

The formal project proposal for the modification and improvement of the No. 2 Storage Room at 105 KW to provide adequate laboratory facilities for the Special Irradiations Unit is being routed for final approval.

The Snout I facility with its uncooled aluminum thimble was removed from the Y test hole at H on August 9, 1955. This was replaced with a similar modified facility having no uncooled aluminum during the regular pile outage on August 22. The facility is operating satisfactorily.

Two vertical height traverses were completed at the request of the Process Sub-Section. Vertical safety rod No. 33 at 105-F was borescoped on August 8 and tube channel 2778B was borescoped on August 3 in compliance with requests from the Manufacturing organization.

PILE MATERIALS SUB-SECTIONPILE GRAPHITE STUDIESBorescoping of the VSR Channel No. 33-F

The vertical safety rod channel No. 33-F was borescoped on August 8, 1955, after the vertical rod failed to enter the pile beyond approximately twenty-one feet.

The borescopic examination revealed that the graphite liner of the VSR channel has been damaged. A one-foot section of the rear graphite liner block was broken and protruding inside the channel, thus blocking the passage of the vertical safety rod.

Each graphite liner block is held to position by two keys. These keys are inserted between the VSR graphite vertical blocks and the adjacent tube channels. The break of the liner block occurred in the space between the keys. A more detailed description of the damage can be found in a report by D. J. Foley, HW-38745.

During the shutdown period July 21 to July 26, 1955, the process tube from channel 2689-F was removed which is adjacent to No. 33 VSR channel. In removing this process tube the new "pull toward the front" method was used with forces in excess of 10,000 pounds. Circumstantial evidence indicates that the damage in the graphite VSR liner block was the result of discharging the process tube from 2689-F.

Borescoping of Channels 3790-B and 3864-B

Process channels 3790-B and 3864-B were inspected on August 2, 1955. No apparent damage was observed in channel 3864-B except for one or two block separations about 3/4 to one inch wide.

A radial crack was observed in channel 3790-B at nine feet eight inches from the front Van Stone flange. This crack appeared to be about 1/16 of an inch in width and it was slightly wider on top than on the bottom of the graphite tube block. No other damage was observed in this channel. Both channels were inspected up to a distance of twenty-two feet from the front Van Stone flange.

Water Vapor - Graphite Oxidation Studies

Considerable experimental work has been conducted to study the reaction rates of graphite with water-saturated carbon-dioxide. The majority of the experimental runs have been carried out at 620 C and 500 C $\pm$ 4 C with irradiated and non-irradiated graphite samples. Efforts are being made to correlate the reaction rates and size of the samples. The results obtained to date will be published shortly in a formal report.

Graphite Burnout Monitoring - PT 105-532-E

Weighted graphite samples, which were charged into bare process tube channels 0965-DR and 2577-DR on April 27, 1955, were discharged on August 16 after an exposure of 92.4 operating days to the prevailing pile temperature and pile atmosphere conditions. The average burnout rates, as determined by weight losses, are tabulated below.

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<u>Channel No.*</u>	<u>Position From Front Van Stone Flange (ft)</u>	<u>Sample Diameter (inches)</u>	<u>Average Per Cent Weight Loss/1000 Operating Days</u>
0965-DR	11.00	1.25	0.11
0965-DR	19.50	0.40	0.22
0965-DR	21.83	1.25	0.13
0965-DR	30.33	1.25	0.10
2577-DR	11.00	0.40	0.11
2577-DR	20.75	0.40	0.15
2577-DR	30.33	0.40	0.11

*Samples in 0965-DR were charged in aluminum sample holders, while those in 2577-DR were charged in graphite containers.

The sample temperature varied between 450-480 C in a pile gas atmosphere containing less than 15 per cent helium.

High Temperature Test at C - PT 105-548-E

A supplement to extend this test for another four operating months was prepared and is now being circulated for approval. The extension is required because analysis of temperature data during the first four calendar months of the test revealed that the temperature exceeded 500 C for only two months, and exceeded 550 C for only one month.

Feasibility of Overboring Pile Tube Blocks

The nine tube graphite mockup in 189-D is being readied for use. The Mechanical Equipment Development Unit will test the performance of the overboring device. The effect on tube curvature of various overboring patterns will be determined by Pile Graphite Studies Unit.

Review of Pile Temperature Distribution

An up-to-date survey of pile graphite temperature instrumentation and of temperature distribution is being made. A report evaluating methods of temperature measurement and the effect of the coring of tube blocks at C and K Piles is being prepared from the data.

Follower Furnace Set Up at C Pile - PT 105-548-E

In-pile burnout experiments where graphite samples are exposed to the pile radiations and atmosphere at near ambient temperatures suffer from the fluctuation of their temperatures with time.

The observed weight loss is the integral of the weight loss rate, which is, at present, a poorly known function of temperature. Thus in-pile burnout data can be calculated readily as per cent per operating day - but calculation as per cent per day at a given temperature is practically impossible. This calculation requires that the exposure temperature be maintained constant. Attempts to expose burnout samples in the pile at controlled temperatures have been only moderately successful primarily limited by heater life.

Further, the composition of the pile atmosphere is a time variable and not subject to the degree of control desired for good reaction rate experiments.

The burnout rate of graphite at various temperatures can be determined in the laboratory. Previously irradiated and partially oxidized graphites also may be used in these determinations. Combinations of gas composition can be varied and controlled at will in laboratory experiments.

The one variable not available for laboratory control is neutron and gamma ray flux intensities comparable to those in a pile. If some idea of their contribution to the burnout rate were available, the job of extrapolating laboratory data to pile operating conditions would be simplified.

The follower furnace is an attempt to develop this information. Graphite samples will be exposed in a bare graphite channel in C Pile (2773-C) and at the same time similar samples will be placed in a furnace outside the pile. This furnace is made from a graphite tube block with calrod heaters attached to the outside. The pile gas is piped to the furnace through an orifice that limits the flow to a value comparable to that estimated to be flowing through 2773-C. The furnace temperature controller derives its control signal from a thermocouple located adjacent to the samples in the pile. Supplementary ring heaters and controllers provide a central linear temperature zone of nearly two feet in the furnace.

The furnace should provide a set of comparison samples having:

1. the same temperature history,
2. exposure to the same gas atmosphere,
3. the same gas flow rates,
4. the same size and shape,
5. the same type of sample carrier,
6. the same geometrical environment,

as those exposed in 2773-C.

The differences in weight losses observed between these two sets of samples then should be attributable to the radiations present during the exposure.

The exposure channel (2773-C) is surrounded by enriched columns to increase both the flux and temperature. This was done in order to get data under potential future conditions of pile operation.

The control equipment is completed and has been tested in the shops. It is now located at the equipment site on the -9 level at C Pile. The taps into the gas line at C have been made but the furnace is not yet connected to them. The control signal for the equipment was to have been Reactor Thermocouple 59-G-1 and leads have been run to that junction box. However, this thermocouple recently has become intermittent and probably will not be suitable for the signal. A thermocouple stringer for insertion into the rear of 2773-C is being assembled now.

The two sets of samples have been prepared, measured, and placed in their carriers.

The following work must be done before the experiments may be started:

1. Connect gas lines to furnace.
2. Get instrument air supply to -9 level.
3. Install thermocouple in 2773-C.
4. String thermocouple leads from rear face to -9.
5. Connect and test run controller.
6. Install samples in 2773-C and furnace.

GRAPHITE AND MATERIALS DEVELOPMENT

Alternate Pile Atmosphere Study, PT-105-535-E

Six of the eight sample carriers remaining in process tube 0776-H were discharged from the pile. The remaining two containers could not be retrieved because the wires which had connected them to the sample train had parted. Each sample container contained four weighed graphite samples which were exposed to a gas mixture containing about 75 per cent CO₂ and 25 per cent CO for 117 operating days at the ambient pile temperature and flux intensity to determine the burnout rate of graphite exposed in this gas atmosphere.

These samples exhibited a constant burnout rate from 3.5 feet to 22 feet from the front edge of the stack, neglecting the lost samples. This compares with samples exposed in process tube 1982-H to an atmosphere of about 95 per cent CO₂ and 5 per cent CO which showed a peak burnout rate at a distance of about 5.8 feet from the front edge of the graphite stack and essentially constant rate between 10.5 feet and 22 feet from the front edge of the stack. The constant rate for both virgin and previously irradiated graphite in 0776-H amounts to about 0.3 per cent per 1000 operating days, one third of the value for virgin graphite in 1982-H or one quarter that for previously irradiated graphite in 1982-H. Rates for the previously irradiated graphite in 0776-H did tend toward a maximum at 5.8 feet; however, this maximum is only a factor of two higher than the constant rate and is thus still reasonably small. These rates compare favorably with current burnout rates in the pile gas atmosphere at H Pile. Latest values for the burnout rate in the central region of the pile, that is about 12.8 feet from the front edge of the stack, are 0.6 per cent per 1000 days in 2577-H and 0.3 per cent per 1000 days in 4165-H. The gas atmosphere during this period contained about fifty per cent helium.

Upon pressure testing the two process tubes, it was found that both tubes leaked and therefore supplement C of this test will not be charged until the tubes are replaced. The replacement and charge is scheduled to take place early in September.

Thermal Annealing of Damaged Graphite

Samples of graphite with exposures of 2291 and 1430 MD/CT in a cooled test hole have been annealed while in the X-ray diffractometer. Prior to annealing, the (002) peak of both samples was quite broad and unsymmetrical. During annealing both the peak shape and peak position changed, introducing an uncertainty in the shift of the peak position. It appears that this will be a problem for all samples with exposures greater than about 1000 MD/CT.

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It was noted that little annealing to either the peak shape or position occurred with these samples until a temperature of about 125 C was reached. This indicates the absence of low activation energy damage and is consistent with studies made of the effect of exposure on the 200 C stored energy release peak.

A paper entitled, "Thermal Annealing Kinetics of Co Spacing Damage in Irradiated Graphite," HW-37376, which summarizes this work to date, has been prepared for presentation at the 128th National American Chemical Society Meeting in Minneapolis.

Theory of Radiation Damage to Graphite

Considerable time has been given to a review of a recent paper by W. Primak (ANL-OCS-422) in which an isothermal radiation damage theory is proposed. Comments on this paper have been made in HW-38714 and HW-38725. Some data obtained at Hanford are being reviewed in the hope that some of the conclusions of this theory may be tested.

Stored Energy in Graphite

Further effort in the calibration and improvement of the stored energy calorimeter has resulted in the availability of additional high temperature stored energy release curves. The most recent runs on 558 MD/CT graphite show a slightly different spectrum from that reported last month. Negligible stored energy was found to be releasible at 550 C and in the range 800 to 950 C. In addition to the major peak at 200 C where the stored energy release rate exceeds the specific heat, a minor peak occurred at 600 C with a stored energy release rate of approximately 0.15 cal/g/°C.

To better record the 200 C peak experiments are being performed to add sufficient heat capacity to the system to obtain complete control at all times. For the rest of the spectrum it is advantageous to have as little thermal inertia as possible.

Uncooled Test Hole at C Pile

The charging of graphite samples into the ambient pile temperature test hole at C Pile was attempted, however, not accomplished this month. The aluminum lining of the cast iron shield has slipped to an obstructing position in the Y hole opening. A cutter has been built to remove the portion of the aluminum sheet in the hole. When this is accomplished, the samples will be charged into the pile.

Physical Distortion of Graphite Irradiated in 1982-H

Thirty-six KC graphite samples irradiated in process tube 1982-H received exposures from 80 to 810 MD/AT at temperatures from 225 C to 440 C. The transverse samples all displayed a slight expansion over this range with the maximum expansion of 0.01 per cent at 500 MD/AT. The parallel samples showed indiscriminate expansion and contraction also slight. One sample contracted 0.01 per cent at 350 MD/AT and 340 C.

The distortion trend indicates that the transverse samples expand slowly to 0.01 per cent at around 500 MD/AT then contract to 0.005 per cent at 800 MD/AT. The

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parallel samples apparently expand linearly to 0.005 per cent at 800 MD/AT. It must be remembered that these physical distortions are very small, and barely fall within the precision of the method.

Physical Properties Measurements

A total of ninety-four graphite samples were studied in the X-ray laboratory during the month. Duplicate analyses of seventy samples were made for both Co and Ao parameters and for crystallite size in both the C and A directions. Co parameter was measured on seven low exposure samples, the remaining seventeen samples, all at high exposure, were annealed in the diffractometer and the shift of the (002) peak was observed.

Sixteen samples were processed through the thermal conductivity laboratory in preparation for exposure under PT-403. Difficulties encountered with the apparatus included fluctuating bell temperature and worn collets which result in poor thermal contact to the sample. Fluctuations in bell temperature were stabilized by insulating the outside of the bell and relocating the bell temperature thermocouple to a more representative position. Four new collets were made by Technical Shops with strict adherences to tolerances. Future operation will evaluate the importance of obtaining collets of uniform fit.

RECIRCULATION TECHNOLOGY

Recirculation Studies

A charge of slugs was discharged from the H-loop after an exposure of 48 days to pH 5.3 water at an outlet temperature of 200 C. A slight reduction in corrosion rate was observed compared to previous runs at higher pH; at 200 C the penetration rate is approximately 1.5 mils per month. The loop is now charged with coupons of a special high temperature aluminum alloy in addition to standard fuel elements. The current run is scheduled to operate for five months in order to obtain full exposures on the slugs.

Following modification of ELMO-4 loop, four simulated slug rupture tests were conducted. Exposure of a prototype KER cluster element showed that swelling of one defected rod does not block flow, but large amounts of UO_2 touched the adjacent rods. Two wafer tests were performed with 3/16 inch uranium wafers; partial flow stoppage occurred with 0.2 inch aluminum wafers, and total stoppage occurred with 0.005 inch aluminum wafers. In the latter case, the rupture involved at least six of the uranium wafers. A bare uranium rod was also exposed to the high temperature (280 C) loop water. The rod was uniformly reduced in diameter, at a roughly estimated rate of one-eighth inch per hour.

The potential of aluminum as a fuel element cladding material in a high temperature pile was examined from the standpoints of tube power, water temperature, metal exposure, and surface area-to-volume ratio of the element. It appears that if certain realistically assumed improvements in corrosion rates can be obtained a large portion of the slugs in a pile operating at 250-300 C outlet temperatures can be aluminum jacketed.

The assembling of detailed information regarding the technical problems which would be associated with the conversion of a Hanford reactor to the use of a high temperature, recirculatory coolant is in progress. The following factors are involved in the evaluation: the effects from graphite, fuel element suitability, nuclear safety, reactor structural problems, the effects from reactor shielding, operational physics considerations, and time operated efficiency.

1706-KE Semi-Works

Operation of the in-pile water quality tubes continued, with no unusual difficulties being encountered. The purging system was checked out and found to perform satisfactorily. Continued difficulty with acid circulation pumps was experienced.

Installation of service facilities to the loop room progressed. Carbon steel loop ELMO-5 was completed and is now being installed in 1706. Some work was done on fabrication of the isothermal corrosion test loop and the thermal convection loop. Arrangement drawings of the mock-up single-pass boiling facility were made up and a work order issued for fabrication. The mock-up installation will provide a thorough check of the control instrumentation before the in-pile work is begun.

KER Recirculation Test Facility

All work by Minor Construction forces in the 1706-KER building was stopped. It is expected that AEC will extend invitations next month for "lump sum" bids on completion of the facility. Discussions were held with members of several other interested organizations regarding pile safety aspects of KER operation. Further progress was made on the operations manual for the building.

Three bids have been received on ribless KER process tubes fabricated of Zircaloy-2. The bids are being reviewed, and an order will be placed shortly. Anticipated costs of the tubes are \$3000 for six tubes, corresponding to \$10 per foot of length, or \$3.50 per pound of finished tube. Estimates of the in-hour costs that would result from the use of stainless tubes in place of zirconium show that well over \$100,000 per year would be required for enrichment in the four KER process tubes.

The study continued to evaluate the present design of the loops for boiling tests and to determine what modifications may be required. Results of the study indicate the need for a pressure sensing device at the tube outlet to control the setting of the inlet flow valve. Additional control and safety devices will probably be needed to compensate for minor changes in tube power and temperatures.

A study was initiated to examine the possibility of installing an in-pile test hole section in conjunction with a KER loop. Such an arrangement would facilitate the re-exposure of special fuel elements for metallurgical study and might make a loop adaptable to in-pile rupture studies or recirculation of fission products in water.

PILE COOLANT STUDIES

Production Tests

The zircaloy-2 tube, installed in channel 3586-D under PT 105-555-E, operated satisfactorily during the month. This tube is charged with weighed, regular metal which is scheduled for discharge at 600 MWD/T exposure.

Under the provisions of PT-105-543-E and DT-105-557-E, fifteen 72S clad and eleven unclad 63S aluminum process tubes have been installed in the old reactors. When nine of the unclad 63S tubes were installed this month at B reactor a 72S clad 2S aluminum tube was installed as a control tube.

New equipment proposed by the Design Section for the preparation of activated silica utilizes neutralization of up to 96 per cent of the initial alkalinity of the sodium silicate, resulting in a solution gel time of approximately fifteen minutes. With the proposed equipment, activated silica can be prepared on a continuous basis whenever desirable. Substantial savings in equipment cost, installation costs, and maintenance costs should be possible from use of this proposed equipment. Since evaluation of activated silica prepared with greater than 92 per cent neutralization has not been carried out on a plant scale, Development Test 105-558-E was initiated to authorize plant scale testing of activated silica production with 92 to 96 per cent neutralization. Operation under this Development Test was begun at 183-C on July 20. Feeding of this solution to C reactor cooling water was started on August 4, 1955. Fresh silica solution is now being made up once each shift, and feed to C reactor process water is continuous to give a concentration of 1 ppm. Operation of this test indicates highly neutralized silica to be at least as good as our present silica with respect to film formation tendency, ease of preparation, and flocculation aid efficiency.

Corrosion Monitoring

In document HW-38708, "Process Tube Corrosion and Replacement Rates", an analysis of the condition of the pile process tubes is presented. It was recommended that the reactors continue to operate with their present bulk outlet water temperatures. With tube replacement based on a calculated minimum residual wall thickness of 0.025 inch, operation in this manner will require replacement at D and F reactors of up to 50 tubes per month within the next six months. In addition, it will be necessary to immediately replace approximately seventy of the most severely corroded tubes at D reactor. In all of the older reactors approximately 1000 tubes will have to be replaced in the next year. The severity of external tube corrosion at F reactor may require that one of the suggested alternate tube replacement schedules be followed if an excessive number of leaks occur under the recommended method of operation.

Twenty-five process tubes were examined during the month. Six tubes removed from F Pile, 5 leakers and 1 rear Van Stone leak, were covered with corrosion product on the outside just upstream of the rear gunbarrel. Fifteen tubes from B and H Piles had average residual wall thicknesses which were in good agreement with the predicted wall thicknesses.

An analysis of the black deposit scraped from the number 2 HCR at DR Pile on 6/23/55 has been made. The material is mainly aluminum and molybdenum, indicating that the deposit has probably collected from the molykote applied to the rod when it was installed in the pile.

Laboratory Corrosion Tests

A test to determine the difference in 2S and 72S aluminum corrosion rates has been completed. The alloys were tested in both the annealed and work hardened condition,

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and both autoclaved and unautoclaved. The specimens were exposed to pH 7.6 process water, 2 ppm sodium dichromate, at 110 C for 52 days. There was no significant difference in the corrosion rates of 2S and 72S aluminum; the hardness of the specimens had no apparent effect on corrosion rates; but autoclaving reduces the corrosion rate of both 2S and 72S aluminum.

All seven in-pile tubes being supplied water from the 1706-KE facility operated normally during the month. Tube powers at 105-KE are still being limited by the inlet pigtail assembly; therefore, outlet temperatures have been low. Installation of new pigtails has tentatively been scheduled for September. After the pigtail outage substantial increases in tube powers are anticipated. Plans have been made to install B, D, F type process tubes in some of the 1706-KE channels during the pigtail outage. These tubes will be operated at outlet temperatures as high as instability considerations permit. Preliminary calculations have shown that outlet temperatures of 105 to 110 C may be attained without rear face pressurization.

During the past month the 1706-KE process tube purge injection system was checked out. Purging during operation is scheduled for test prior to the pigtail outage.

The weight loss of regular metal and thick and thin wall hot press slugs, with various types of surface treatment, all fell within the normal weight loss range for aluminum slugs after 45 days exposure to 110 C pH 7.65, 2 ppm dichromate process water. Although there appeared to be no significant difference in the corrosion rate of the different types of surface treatment, all except one of the thick wall hot press M329 alloy cans had a slightly higher weight loss than the thin wall hot press cans for the same surface treatment.

Minislugs have been discharged after 20 days exposure in pH 6.5 and 7.0, 2 ppm dichromate process water at 115, 135, 155 and 175 C. The portion of the test operating at pH 7.0 and 175 C was discontinued because the minislugs were covered with a heavy layer of boiler scale. The tube was recharged with slugs and is now operating at 165 C.

FUEL TECHNOLOGY SUB-SECTIONFUEL ELEMENT DEVELOPMENTWafer Slugs

Wafer slugs may provide compartmentation against corrosion of uranium cleavage, lower maximum uranium temperatures and temperature gradients, and resistance to warping. Slugs of this type have been assembled previously by vacuum canning and by hot pressing; during the past month, hot dip canning techniques for two types of wafer slugs have been evolved. Sketches of the two slug designs are shown in Figure 1 on the following page. Components and assembly procedures are outlined below.

1. Jacket components were prepared in Technical Shops by modifying production caps and cans. Sketches of the components are shown in Figure 2.
2. Uranium wafers for these preliminary experiments were machined from Fernald beta heat treated rod. Rolled uranium sheet three-sixteenths inch thick is scheduled to arrive from Fernald by September 6, and will be stamped into wafers; sheet 1/16 and 1/8 inch thick is scheduled to arrive about October 15.
3. Aluminum spacers of two types have been used between the uranium wafers. The first type consists of aluminum foil electrolytically anodized on each side. Such spacers are bonded only at the edges. The oxide coating is principally to insure no U-Al contact and reaction during irradiation of the slug. The second type of spacer consists of aluminum foil clad with Al-Si on each side to facilitate bonding between the wafers, as well as at the edges, and also to prevent U-Al interaction in case the Al-Si braze should fail to penetrate between wafers during canning.
4. Canning tongs of several types have been investigated. Their function is to hold the wafers aligned during assembly of the slug, without interfering with the assembly, and without contacting large areas of the wafers. Two designs have been satisfactory. The first type has three stainless steel arms which grip the stacked wafers along the outside edges; the second type has two arms which align and support the hollow wafers from the inside edges.
5. The slugs were assembled in an induction heated, hot dip furnace. The wafer slugs were preheated in Al-Si rather than in lead, and then canned while submerged in the same Al-Si.
6. Assembly techniques are illustrated in the sketches shown in Figure 2. Slugs have been canned by all four methods; however, method 3 is the most satisfactory. A wafer slug can be assembled almost as rapidly by this method as it could be if it were a one piece slug. Difficulties encountered have been principally those of determining suitable component dimensions, heating times, and canning tong designs. These have been worked out to the point where a large number can be canned by this method if present evaluation work indicates that this type of slug is desirable.

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FIGURE 1. Hot Dipped Wafer Slugs

METHOD I

METHOD II

METHOD III

METHOD IV

FIGURE 2. Candidate Assembly Procedures for Wafer Slugs

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Three wafer slugs of each type, with anodized aluminum spacers or with Al-Si clad spacers, have been canned and have passed autoclave tests. One of each type, along with one hot pressed slug with anodized aluminum spacers, is to be charged into the MTR at Arco, Idaho, on September 12 for irradiation at about 90 KW/ft. Further work with hot dipping wafer slugs will involve canning a number of them for extensive out-of-pile evaluation. The results of the evaluation will be used to improve the canning process and to determine whether a production test in Hanford reactors is desirable.

Heat Transfer Aspects of Internally-Externally Cooled Wafer Fuel Elements

The heat transfer behavior of several types of internally-externally cooled wafer slugs which are to be irradiated in the MTR was estimated (by calculation).

Assistance in making the calculations was provided by Pile Engineering and Physics Research. The following is a description of the pieces analyzed. The results are shown in Table I.

Hot dip, Al-Si spacer

Uranium wafers, 1.336" O.D., 0.548" I.D., 1/8" thick

Aluminum wafers, 5 mils thick, bonded to uranium wafers with Al-Si

Canned slug, 1.440" O.D., 0.405" hole diameter

Hot dip, Al spacer

Uranium wafers, 1.336" O.D., 0.548" I.D., 1/8" thick

Aluminum wafers, 5 mils thick, anodized, not bonded to uranium wafers

Canned slug, 1.440" O.D., 0.405" hole diameter

Hot press. Al-Si spacer

Uranium wafers, 1.344" O.D., 0.437" I.D., 1/8" thick

Aluminum wafers, 5 mils thick, bonded to uranium wafers with Al-Si

Canned slug, 1.436" O.D., hole tapers from 0.370" to 0.375" diameter

Hot press. Al spacer

Uranium wafers, 1.344" O.D., 0.453" I.D., 1/8" thick

Aluminum wafers, 5 mils thick, anodized, not bonded to uranium wafers

Canned slug, 1.436" O.D., hole tapers from 0.370" to 0.375" diameter

TABLE I

Heat Transfer Aspects of Internally-Externally Cooled Fuel Elements

Slug Type	Power Generation	Maximum U	Water Film Temp. Drop. °C	
	KW/ft.	Temp., °C	Annulus	Hole
Hot press, Al-Si spacer	75-95	257-318	82-104	103-131
Hot press, Al spacer	74-94	309-384	81-103	102-130
Hot dip, Al spacer	70-88	263-326	78-99	103-131
Hot dip, Al-Si spacer	70-88	216-267	78-99	103-131

Note: Calculations based on power generation of 87 KW/ft for a solid uranium Hanford slug in the same MTR position, and a local water temperature of 30 C. The lower figures for power and temperature are based on the assumption of no change in slug flux distribution due to the presence of water in the 3/8 inch hole. The higher numbers are based on the assumption of flat flux across the slug. The numbers given should therefore represent lower and upper limits under normal flow conditions.

Cladding Billets for Co-Extrusion of Uranium with Stainless Steel

One unalloyed uranium billet has been prepared for cladding with (type 347) stainless steel. The surface is quite acceptable being free of cold shuts and containing very few pinholes. These pinholes are very small and the location of each has been noted. The 347 steel jacket in which this billet is to be enclosed is also complete, but the cap has not yet been received from the machine shop.

Cold canning will be delayed until a firm shipping date is fixed. The billet will be enclosed immediately prior to the time of shipping so that cleanest uranium-steel interface obtainable will be charged into the extrusion press.

Material is on hand for use in preparing other billets after data from this first extrusion has been analyzed.

Self-Supporting Slugs for Use in Ribless Process Tubes

Five lead dip canned, eight-inch slugs having welded and machined projections around the can wall at the slug ends are now ready for flow laboratory studies. Three small projections equilaterally spaced around each end will support the piece in a 1.603 inch inside diameter tube. These slugs are to be tested in flowing water and the resulting films are to be examined for signs of erosion-type corrosion which may result from water turbulence.

Five four-inch, cold closure slugs are nearly ready for testing in ribless tubes also. These pieces have three, equilaterally spaced, full-length longitudinal ribs. Comparison of the two types should permit evaluation of the load supporting capabilities of the two types as well as provide data on corrosion behavior. If the small projections will support the slug without producing undue amounts of erosion-corrosion, they would be superior in that warped slugs would not present such an extreme discharge problem. The small projections would shear and deform under the discharge load, but full-length ribs would not.

Slugs for Process Water Recirculation and Slug Rupture Studies

Two slugs designed to simulate split-type ruptures in the ELMO-4 apparatus were delivered. The pieces had been cold canned with a tin-sealed pinhole in the can designed to permit water entry into a 0.75 inch deep slot milled longitudinally in the slug when the can temperature reached 230 C. They were autoclave tested at 170 C for four hours prior to delivery to minimize the possibility of charging leaky samples into the recirculation equipment.

One of the pieces has been ruptured in ELMO-4 and has apparently performed satisfactorily. Complete water flow stoppage took place after six minutes at 230 C and the ruptured piece split the enclosing section of standard process tube. The other slug has not as yet been used.

This design having proven satisfactory, it is felt that slugs which will rupture reproducibly at selected temperatures in the range 200 to 300 C can be prepared by alloying the tin plug with a second metal.

Evaluation of Dingot Uranium (PT 313-56-MT)

The evaluation of dingot uranium has continued. The testing program to determine the pre-irradiation properties is almost complete.

The overall chemical analyses results indicate that the total average impurity content in the six lots of dingot uranium is less than 0.06 percent. This means that the dingot uranium contains 99.94+ percent uranium.

Tensile tests conducted on specimens of each type of metal indicate that differences in the fabrication histories of the dingot metal have no significant effect on the mechanical properties. Also, little difference in mechanical properties between ingot and dingot uranium is indicated.

Sonic flexure orientation values have been determined on 110 slugs from the material to be charged under PT 313-56-MT. Results of these tests indicate generally that the orientation approximates that which is found in rolled ingot uranium which has been salt bath beta rod transformed. An analysis of orientation data shows there apparently exists two groups of dingot slugs in this test material whose orientation should result in different irradiation behaviors. A small group of slugs may elongate on irradiation; however, the majority of the material should shorten on irradiation. There appears no correlation between this variation in orientation and variation in fabrication procedures.

Process annealing of the dingot slugs for PT 313-56-MT has been completed but difficulties were encountered in pickling the adherent salt and oxide coatings from slugs prior to canning. As soon as a dip pickling facility is available, canning of the control piece will proceed.

Evaluation of Uranium-1.5% Silicon Alloys

Metallurgical examination of cored, extruded silicon-uranium alloy from derby production has shown the extruded rod to have a severely cold worked area surrounding a central recrystallized area. The recrystallized area about the core does not have the columnar structure common to normal cored extruded uranium. After a normal beta heat treatment, the grain size and other properties are like those of silicon alloys tested previously.

At temperatures above 70 C the ultimate strength of the silicon alloy is approximately 30,000 psi greater than that of unalloyed uranium. At 200 C the yield point of the silicon alloy is equal to the ultimate strength of unalloyed uranium.

Metallographic examination of the dingot alloy shows it to be very clean of impurities. The hardness of the dingot alloy is 2 to 3 points lower than ingot alloy, probably due to the lesser amount of impurities.

Induction Heat Treatment of Uranium

Observations and generalizations drawn from the study of induction heat treating to date are listed below:

1. Induction heat treatment under any of the heating-quenching cycles so far employed does not result in the objectionable reticulate structure which is characteristic of salt bath treated uranium.
2. Instead of adding hydrogen to the uranium, induction heating actually reduces the total hydrogen content of the rod by 35 to 75 percent. This effect, also observed in earlier studies conducted in 1949, suggests useful application to dingot rod processing, where the hydrogen content is abnormally high.
3. As measured by the sonic orientation tester, a high degree of randomization of crystallographic orientation (better than in salt bath treated metal) is obtainable by heating the uranium rapidly into the low beta phase; immediately cooling rapidly across the beta-alpha transformation; and allowing the rod to cool slowly in air from high alpha temperature for about two minutes before quenching in water. This cycle is readily applied with induction equipment by using spray jet rings for stepwise cooling.
4. In the samples showing the most random orientation, produced as described above, the grain size was objectionably large; however, it seems probable on the basis of the results of the present and earlier experiments, that by starting into cold worked uranium rod instead of already-recrystallized rod, and by employing close temperature control throughout the heating-cooling cycle, it will be possible to produce fine grain size and random orientation simultaneously.
5. Although, in the present small-scale experiment, no combination of operating conditions has yet been found which gave a combined grain-size and orientation better than that obtained by salt bath heat treatment, there is good reason to believe that such a set of conditions may be found with further exploration. Furthermore, the low hydrogen aspect of the process, coupled with its versatility, cleanliness, low operating cost, and potential reproducibility of results, make it worthy of development to a production stage as soon as possible.

Grain Size of Uranium

Work on the determination of grain size in beta transformed uranium has resulted in a very promising technique for estimating grain size. Using this technique, a grain size determination is made at 20X under bright field illumination on a macro etched uranium specimen by comparison with a standard grain size chart

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developed in the course of this work. Grain size estimates made on selected samples by several different observers compare very closely. To further increase the accuracy of the grain size estimates a micrometer eyepiece with eight different grain size networks is being constructed.

Determination of Uranium Grain Size by Ultrasonic Testing

In the past when ultrasonics⁽¹⁾ were used to estimate the grain size of uranium, the maximum pip height read on the screen, as the slug is rotated 360 degrees through the ultrasonic beam, was used to calculate the grain size. Recently, while attempting to apply this technique to slugs of several grain sizes, it was found that the maximum pip height varied markedly along the length of the slugs tested. In addition to this problem, the use of maximum pip height for calculation of grain size results in an estimate of the minimum grain size of the sample. Therefore, to determine average grain diameter in uranium slugs various techniques for finding the average rather than the maximum pip height around the slug circumference are being investigated.

Burst Testing

A review of the burst test technique was made. Preliminary discussions with Metallurgy Research Sub-Section personnel indicate that it is feasible (with certain equipment additions and alterations) to use their tensile testing apparatus for burst testing as defined by this review. The equipment is being modified. It is expected that standardization of the test can be started in two to four weeks.

Woodsplitter

IR-184, Expansion of Facility for Testing Fuel Elements by Induction Heating, 314 Building, has been accepted with several exceptions. A step-wise trouble shooting program has been started to explain a loss of approximately 50 kilowatts of power at peak load demand. At present the loss is thought to be a function of inductance-reactance associated with the 50-60 foot lead wire from machine to work stations.

Several phases of the program for evaluation of the woodsplitter as a destructive test for the development of fuel element design and correlation with pile experience, has passed from the planning stage to an active working status. Several different types of "notch sensitive" uranium specimens have been prepared and are ready for woodsplitter cycling. The notch is so designed to induce embrittlement to control the mode and to accelerate the rate of failure.

Aluminum Alloys

Fifty of the 1% Ni alloy caps and cans have been received from Alcoa. Shipment of the remaining 450 by railway express is expected soon. Sheet and rods of the 1% Ni alloy have been shipped by carload and are due to arrive sometime this week.

(1) HW-26003, "Preliminary Report on the Ultrasonic Properties of Uranium," D. C. Worlton and E. C. Wood, October 22, 1952.

Alternate Vendor Evaluation

Considerable time has been spent on this phase of the work. The metallographic structure of the caps made by Harvey Aluminum Company has been approved. Cans and caps fabricated by Hunter Douglas have been examined but have not yet been approved. The structure of the Hunter Douglas components is definitely different, but it has not yet been established whether or not any harmful effects will arise from it.

MIZ-1 Evaluation

Little work was done on this project in the last month and the status is essentially unchanged. Unless different results are obtained in future examinations, it appears that the MIZ-1 is too sensitive to surface imperfections to be used for detecting inclusions within the can wall.

Zircaloy-2 Progress

A request for bids has been submitted for the procurement of 50 ten foot lengths of 20 mil wall by 1.440" O.D. zircaloy-2 tubing which will be used to provide zirconium cladding for test fuel elements. A short length (approximately 16 feet) of KER tube from zircaloy-2 has been satisfactorily tube reduced. This length will be shipped to HAPO from Bridgeport Brass Company in September.

The extrusion of H-pile size zircaloy-2 tubing has been postponed indefinitely, due to floods at Chase Brass Company.

Metallography Laboratory

During the past month over 130 photomicrographs and 70 photomacrographs were logged. The rough polishing equipment was properly installed during the past month in a recently acquired work area. The laboratory facilities are gradually increasing and the expanded work area has relieved the congestion.

John Sabel, Bausch and Lomb representative, was contacted concerning the Balphot Metallograph. The photomicrographs taken on this metallograph are consistently out of focus on one side and it was agreed that this may be due to misalignment of or damage to the crystal prism or to misalignment of the light source. The Balphot is inferior to the B & L Research metallograph, especially when polarized light is being used. However, the photomicrographs taken on this metallograph are suitable for record purposes.

306 Building Fabrication Equipment

Fabrication equipment that is available for use includes the following items:

1. Six-inch rolling mill.
2. Fenn #8A swaging machine (only a limited number of dies are available).
3. 20 KW vacuum induction furnace.
4. Ten-inch portable salt bath furnace.
5. Ten-inch stationary salt bath furnace.

6. 11 KW muffle furnace.
7. 50 ton hydraulic press.
8. 400 ton hydraulic press.

A general clean-up of the pneumatic forging hammer is in progress and the hammer should be ready for service soon. The traveling bridge crane over the large salt baths is in operation. It is planned that the 36-inch and the 72-inch salt bath will be placed in operation immediately after the roof leaks are repaired.

The electric clutch and brake assembly which was received recently from the Fenn Company has been installed on the swaging machine but its operation is still not considered satisfactory.

314 Building Equipment

Project CG-620 for the revision of the Melt Plant is being reviewed to determine if the present proposal and design are adequate to satisfy the work requirements.

A new vacuum chamber has been designed and is being fabricated for use with the outgassing furnace. This equipment should be in operation by September 1.

FUEL ASSEMBLY

Surface Defects in Autoclaved Slugs

The reject rate during the month for surface defects in slugs processed through water autoclaves averaged 7.8 percent and through steam autoclaves 4.4 percent. Reject rates as low as 1.5 percent have been observed but this is attributed to variations in inspection rather than to discrete process changes. The test results obtained to date have not established conclusively the source or cause of the observed surface inclusions. All but one bank of autoclaves (5) have now been converted to steam with the water autoclaves being utilized for comparison purposes.

Slugs were processed in two enclosed 2S aluminum autoclave baskets to isolate the slugs from the autoclave environment. Only one inclusion was found in a total of 88 slugs during the initial run. However, 15 inclusions were observed when the test was repeated; an inclusion rate higher than the 5.4 percent reject rate observed for the companion autoclave pieces.

An extensive program has been initiated in the Coatings and Corrosion Unit to determine the effect of the inclusions on the corrosion resistance of the fuel elements by production testing and studying artificial inclusions. The program will also investigate the possibilities of removing the inclusions chemically or by other means. It is thought that anodizing, etching or polishing processes may eliminate, remove, or neutralize the effect of these inclusions. Pending receipt of samples of cans containing these inclusions, information on aluminum erosion rates versus time and temperature are being gathered for several baths. This information will establish operating limits for maximum allowable reductions in can wall thickness.

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Autoclave Cleaning

New reagents, Turco Descaler and Turco 3557 phosphating agent, have shown promise as a process for cleaning and coating the 313 autoclaves. The process is now being evaluated in the 313 autoclaves.

Fabrication of Double Length "C" Alloy Slugs

Fabrication of double length "C" alloy slugs has been delayed pending installation of automatic Fillerarc equipment. Satisfactory welds could not be produced routinely with the available semi-automatic equipment although acceptable slugs were produced during preliminary evaluation tests.

The principal weakness of the semi-automatic equipment, shown by high-speed motion pictures of the process, was erratic wire feeding at the beginning and end of the welding cycle, which resulted in misfires, spatter, and either excessive or insufficient weld deposit. It is planned to resume the production test fabrication on or about September 1.

Cored Slugs with Crimped Uranium End Plugs

Four control tubes of cored slugs with crimped-in uranium end plugs were charged in C pile August 25. These slugs are scheduled for the following exposures: 1 tube to 300 MWD/T; 1 tube to 600 MWD/T; and, based on examination of the column discharged at 600 MWD/T, the remaining 2 tubes may be irradiated to 900 MWD/T.

Effect of Core Surface on the Can-Core Bond

Tests are in progress to establish the effect of differences in the uranium surface finish produced during core preparation on the strength of the bond produced during lead dip canning. Recent production slugs have been finished by either machining or grinding (machined finish is now standard). Some have also been subsequently heat treated in molten salt (outgassing anneal for material of high hydrogen content). Preliminary results indicate that weaker bonds result from salt treated uranium surfaces.

Hydrogen Specification

The program to determine, by a rapid analysis technique, the maximum allowable amount of hydrogen that can be tolerated in HAPO slug cores before braze porosity reject rates become excessive, has continued this month without any definite relationship being established between sonobond, frost test, autoradiograph, total hydrogen, and rapid hydrogen.

Several groups of slugs, each group containing a different range of hydrogen content, have been lead dip canned, frost and sonobond tested, and autoradiographed. Control slugs in adjacent positions on the rod to the canned slugs have been analyzed by both a rapid and total method for the hydrogen content. Incomplete results fail to establish any definite relationship between sonobond, frost test, autoradiographs, total hydrogen, and rapid hydrogen. The experimental work will be continued and the complete data submitted to the Statistic Group for analysis.

Hydrogen in Production Uranium

A relationship between the absolute humidity, the hydroxyl content of the beta heat treating bath, the hydrogen content of heat treated uranium, and frost test plus void reject rates of HAPO lead dip canned production slugs has been observed by FMPC. Analysis of heat treating data and HAPO canning yields indicates that if the hydroxyl content of the bath is kept below one percent the canned rejects at HAPO for braze porosity will be kept below the respectable figure of two percent. To further establish this relationship, Fernald has maintained the hydroxyl content of the heat treat bath below approximately one percent for a period of three weeks (August 3 through August 22) by purging the molten bath with approximately 200 pounds of carbon dioxide daily. The reject rate of slugs canned with the uranium produced during this period will be compared with uranium canned prior to reduction of hydroxyl content.

Hot Press Canning

Sixteen hot press canned, internally and externally cooled, hollow fuel elements were fabricated for the NAA in-pile safety fuse experiment. The purpose of these pieces is to prevent neutron flux depression at the fuse, yet permit various leads to be brought from the fuse to the outside of the pile. Exposures will range from a few weeks to 600 MWD/T.

Recent evidence indicates that, for the sonobond test to pick up unbonded areas in hot press canned fuel elements, an actual physical separation must exist between the can and core; therefore, various pre-sonobond treatments, which will effect a physical separation at unbonded or weakly bonded areas, are being explored. Preliminary tests indicate that induction heating is successful on completely non-metallurgically bonded slugs. Additional tests are planned to determine the smallest unbonded area in which the jacket can be separated from the core by induction heating.

The Ames metallurgical laboratory is experimenting with a hot dip method of apply sweater coats. A number of four inch cores dip coated with Zn, Zn-5w/o Al, and Cu-9.7w/o Mg were sent to Hanford for evaluation. Two pieces of each type were hot press canned for bond strength and undercutting studies. No bonding occurred between Zn-Al coat and the aluminum jacket, and the Cu-Mg coat was weakly bonded to the aluminum jacket. However, a uniform bond which compared in strength to the Al-Si/aluminum bond occurred between the zinc coat and the jacket. One fuel element of each type will be subjected to undercutting tests.

Hot pressed fuel elements were exposed in a flow tube to 110 C process water for 45 days in an attempt to duplicate the jacket damage and attack noted on the irradiated hot pressed pieces. The mechanical damage appears to be related to jacket hardness, which in hot pressed pieces is 25 percent less than dip canned pieces. Micrographs of the jacket grain structure show the hot press material to have a three fold larger grain size than dip canned material, which probably accounts for the softer jacket. Visual examination of the flow tube pieces revealed none of the peculiar plateau type attack noted on the irradiated pieces. On three of the hot press pieces a surface pattern was found which suggested intergranular attack. Two of these pieces were sectioned and slight (< 1 mil) intergranular penetration was found. Further work on the relative susceptibility of hot pressed and dip canned pieces to intergranular attack is being continued.

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Evaluation of Cored Slugs at Increased Power

PT 313-57-MT was originated as a means of comparing the differences in pile performance of enriched (1.75 weight percent U-235) dip canned four-inch fuel elements with core diameters of 3/8-inch and 5/8-inch, and with welded uranium end plug closures and pressed aluminum end plugs. The fuel elements were dip canned last month but a high rejection rate made it necessary to recover and recan the pieces. Sixty slugs have been recovered and recanned. Fifteen 3/8-inch diameter cored pieces with welded uranium plugs, eleven 3/8-inch diameter cored pieces with pressed aluminum plugs, and fifteen 5/8-inch diameter cored pieces with pressed aluminum plugs have successfully passed all standard 300 Area tests and inspections, and are ready for shipment to the 100 Areas.

Dip Canned I & E Fuel Elements

Quotations on two types of aluminum cans being procured for the development of dip canned I & E fuel elements have been received from Alcoa. The type one can consists of a can and tube joined at the base and capped by a normal cap containing a hole for the tube. The type two can consists of a thick based can with a blind hole in the inside of the base to receive the tube, and a well-type cap to which the closed end tube is attached. Delivery on either type will take 12 to 14 weeks after receipt of order.

Zirconium Clad Fuel Elements

A program to provide zirconium-clad fuel elements for the high temperature loops at K pile has been initiated. Three types of elements are presently required, namely: (1) unbonded lead core, (2) unbonded solid uranium core, and (3) Al-Si bonded solid uranium core. Lead cores have been successfully cast into zirconium cans, but the welded closure is awaiting completion of suitable welding equipment. The unbonded uranium cores present no problem, but their canning is also held up for welding equipment. The Al-Si brazed fuel elements will be canned by the zinc chloride replacement process to wet the zirconium.(1) Refinements or modifications to this process will be developed to improve the yield as canning progresses.

A limited number (90) of eight-inch zirconium cans are on hand and 100 more are expected this month. All of them must be unskanned to reduce the can wall from 0.035" to 0.020".

Vacuum Braze Canning

Design and fabrication of the component parts or equipment for vacuum braze canning of uranium in aluminum cans is proceeding. Details of a remote operated Al-Si melting and pouring crucible, the induction heating coil for heating the uranium core, and accessory holding equipment have been completed.

(1) HW-36730, "Canning Uranium in Zircaloy-2 Jackets," J. D. Sprowl, May 17, 1955.

The resistance heated Al-Si melting crucible consists of a one-inch diameter by two-inch high magnesium oxide crucible. With application of 50 volts, 40 grams of Al-Si can be brought to 600 C from room temperature in three minutes. The induction heating coil will be formed from 5/16-inch diameter copper tubing, and will consist of two coils in line, each coil having 7.7 turns with a mean diameter of 2.14-inches. The overall length will be eight inches.

A mock-up slug-holding mechanism has been fabricated to determine the spring pressure required to grip the slug and to operate the release mechanism.

Project Activities

Essentially all of the 314 Building hot press development equipment and the 304 Building dip canning equipment was moved to the 306 Building pilot plant and installed during the month as part of Revision No. 3 to the pilot plant project proposal.

A La Pointe uranium broaching machine, received several months ago, was installed in 314 Building on an appropriation request and is ready to operate.

A lump sum contract for completion of the electroplating room and installation of electroplating, anodizing, can cleaning, and uranium pickle equipment in the 306 Building was let during the month.

Fuel Element Pilot Plant Operation

The pilot plant operated on a single shift basis during August.

The uranium inventory status as of August 1 was as follows:

Total Tons Received	14.3
" " Disbursed	32.5
" " Increment	-18.2
" " Balance	79.6

FUEL EVALUATION

"Low Exposure" Failures

In connection with "side" failures of regular production slugs at exposures of < 300 MWD/T, results of investigations of slug component quality, canning process, irradiation history, and post-irradiation examination have been documented as HW-38629, "Low Exposure Failures: Associated Factors and Hypothesized Causes." It is hypothesized that the failures are due to localized overheating of the slug surface because of slug misalignment in the process tube. Under present in-pile conditions, intergranular corrosion of the aluminum proceeds rapidly enough to cause jacket penetration because of (1) increased aluminum surface temperature compared to a year ago, and (2) possibly reduced canned slug quality.

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Irradiation of Slugs from Large Diameter Ingots

Irradiation experience with solid slugs fabricated from seven-inch hot-topped ingots indicates acceptable performance. Although exposure-wise a relative quality comparison has not been established, changing from five to seven-inch ingots has apparently not adversely effected uranium quality. Briefly summarizing the irradiation history, 2000 tons, including 730 tons of discharges, has been charged in the HAPD reactors. The estimated exposure breakdown is 60 percent under 300 MWD/T, 25 percent between 300-600 MWD/T, 10 percent between 600-900 MWD/T, and 5 percent over 900 MWD/T. During this irradiation there have been 27 failures. However, excluding those at low exposures in 105-C and H and those charged 12-12-54 in 105-D which appear to be due to charging machine damage, only two, a uranium split at 700 MWD/T and an unclassified type at 600 MWD/T, can be considered attributable to uranium quality.

Warp of Extruded Slugs

Statistical analysis of 26 tubes of lead dip rod transformed slugs has provided a basis for interpreting warp observed in in-pile experiments. Methods have been developed for determining whether or not a significant difference exists between standard slugs and test slugs. Conclusions can be drawn either by comparing a tube of test slugs with the 26 tubes mentioned above or by comparing test slugs with standard slugs exposed at the same time and in a similar location. Exposure of standard slugs with test material will permit detection of smaller differences in warp between slug types. A complete discussion of this method has been published.(1)

Analysis of slug warp data by fitting distribution curves to Weibull functions indicates that warp can be correlated with both average tube exposure and tube power. The following conclusions are drawn from available warp data which were directly applicable to present pile operating conditions.

1. At an exposure of 900 MWD/T and 650 KW, 0.17 percent of the fuel elements are expected to warp 80 mils.
2. Below 900 MWD/T, the percent of slugs that will warp 80 mils increases by a factor of 10 for each 200 MWD/T exposure. A factor of 10 increase is also indicated between exposures of 900 MWD/T and 1400 MWD/T.
3. At an exposure of 900 MWD/T an increase in tube power from 500 KW to 1000 KW increases the percent of slugs that will warp 80 mils by a factor of 2.

These data are discussed in detail in HW-38743, "Slug Warp as a Function of Tube Exposure and Tube Power," W. C. Riley and P. A. Carlson, August 29, 1955.

A vacuum anneal at 600 C for 5-6 hours has been found to considerably reduce the in-pile warping of alpha-rolled slugs. The data show that at 900 MWD/T and 800 KW the percent of slugs expected to warp 80 mils is decreased by a factor of 10^4 by the vacuum anneal. These data are reported in document HW-38702, "The Warp of Vacuum Annealed Slugs," P. A. Carlson, August 18, 1955.

(1) HW-38547, "Interpretation of the Warp Observed in In-Pile Experiments," J. L. Jaech, August 8, 1955.

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Fuel Technology Sub-Section

HW-38828

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Warp data from four tubes of alpha extruded slugs at 800 MWD/T and 550 KW charged under PT 313-105-31-M were analyzed.⁽¹⁾ In each of these PT 31-M tubes, 26 alpha extruded slugs were charged with six alpha rolled control pieces. The control slugs were placed at slug positions 1, 3, 14, 16, 30, and 32 in the tubes. Compared to these alpha rolled slugs, the percent of the extruded slugs expected to warp 80 mils when irradiated under the above exposure conditions was found to be less by a factor of 8. Since this difference was obtained by comparison with such a relatively small number of control slugs the extruded pieces were also compared to alpha rolled and lead dip canned slugs irradiated under similar conditions but not as a part of PT 31-M. A difference in favor of the extruded slugs of the same order of magnitude was obtained. It is concluded that the extruded slugs in this test warped significantly less than alpha rolled production slugs.

Effect of Annealing on Tendency for Slugs to be Broken Transversely During Irradiation

The effect of an outgas anneal on the tendency of slugs to break transversely during irradiation was determined by comparing three tubes of annealed material (solid, rod transformed, dip canned control slugs from PT 577) to three tubes of unannealed material (solid, rod transformed, dip canned control material from PT 578). The average tube exposure and power for the annealed material were 950 MWD/T and 740 KW/tube; for the unannealed material, 815 MWD/T and 825 KW/tube. Twenty-seven percent of the annealed slugs were found to be broken in the can as compared with sixty-five percent of the unannealed pieces. At comparable slug exposures and average slug powers, the unannealed slugs showed a greater tendency to break during irradiation than the annealed slugs.

105-C Metal Examination Facility

All equipment provided under Projects CA-431-C and CG-589 have been installed although piping and wiring is not complete.

Basins II and III will be ready for acceptance testing near the end of August when the deficiencies in the slug weigher have been corrected. Successful acceptance testing, and completion of major exceptions, will be followed by cold runs and limited routine examination of irradiated material.

TESTING METHODS

Ultrasonic Bond Test

An ultrasonic mapping device has been developed as an aid in evaluating the bond tester. This equipment, when fed a signal from the instrument, plots a map showing the size and location of unbonded areas. Maps were drawn of some thirty slugs which the instrument had rejected in its latest production run. Twelve of these slugs had been autoradiographed. The majority of the twelve maps, showing the size and shape of the unbonded areas, were in surprising

(1)HW-38024-RD, "Warp as a Function of Tube Power and Exposure," J. L. Jaech, August 14, 1955.

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agreement with the radiographs. The only definite exception to this was one instance in which an area containing a cluster of small voids, as shown on the radiograph, plotted more nearly as a single large void.

The information gained from this test lends credence to the validity of the instruments high rejection rate, as compared to the frost test, and plans are to return it to the 313 Building in a few days.

Uranium Quality Test

Repairs to uranium quality test coil having been completed, about 1000 eight-inch pieces were tested for Fuel Assembly as a shakedown run in the laboratory. The equipment performed satisfactorily and has been moved to the 313 Building where a larger scale test is awaiting the installation of conveyors and drying equipment.

Because the eddy current uranium quality test failed to detect a large internal flaw located roughly along the axis of a slug, two new schemes are being tested to detect flaws so located. End probe coils have been developed and mechanical arrangements are being built so the slugs may be checked by eddy currents on the exposed ends. It has been shown with the Vectorscope, a home-made instrument similar to the Forster Metallotest, that such coils can readily detect the flaw that was missed. It is believed, however, than an ultrasonic method of detecting these will be more generally applicable since the eddy current method is restricted in depth. An ultrasonic device operated at 2 1/4 MC has been assembled which can see the flaw on this particular slug. It is planned to evaluate these two devices on several hundred slugs.

Sonic Orientation Test

Breadboarding of the electronics of the sonic orientation test is complete, and on operation of the various circuitry, appears to be workable. After a functional test of the breadboard, the schematic diagram will be completed and placed in the shop for construction. Mechanical design for the rather complicated handling device for this test is 90 percent complete.

Pulsed Eddy Currents

Work continued in the development of the pulsed eddy current testing method which takes advantage of the fourier components of a pulse to make simultaneous use of the many different frequencies in eddy current testing. In order to study the effects of varying probe coupling, studies at several single frequencies with an oscillating probe have been made. These studies should determine the behavior of what best can be described as a point of invariance in the probe signal with respect to probe motion. This point of invariance is a position in time on the output voltage wave which does not change in amplitude as the position of the probe is changed with respect to the metal. It has been observed both with single frequencies and with pulses, and its position in time changes as the metal examined changes. A qualitative theoretical explanation for this behavior has been developed, and a phase angle at various frequencies

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Fuel Technology Sub-Section

HW-38828

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at which the invariant point occurs has been measured for metals of different conductivity varying from copper to Hastelloy C. These data for each frequency studied are being assembled to synthesize the pulse behavior analytically.

The aluminum depth meter, a single frequency device fabricated for the measurement of can wall thickness on cold canned slugs is being checked out and will be turned over to users shortly.

Internal Friction

Studies continued on the variation of internal friction with vibrational amplitude in uranium slugs. Using a cold box, the slope of the amplitude versus internal friction curve has been measured at various temperatures and found to be a function of temperature. It was also found that, when the temperature is held constant at 8 to 10 C overnight, the slope of the amplitude dependence returns part way to its room temperature value. Tentatively, this is being interpreted in the following way: it is believed that the reduction in temperature produces micro-stresses in the uranium as a result of the differential coefficients of thermal expansion between grains. These stresses change the strain levels about which the oscillations take place. Holding at low temperatures for several hours, however, permits some relaxation of micro-stresses produced by the change in temperature. If this hypothesis is correct, internal friction may well be a very convenient way of obtaining a relative measure of micro-stresses.

Efforts to locate the position of the internal friction peak due to internal relaxation across grain boundaries are in progress. Since this is a function of grain size, it is expected that the variation in internal friction with frequency or temperature will be a measure of the grain size, or, perhaps more properly in uranium, the grain boundary area per unit of volume.

A 2 KW induction heater has been reworked for use in high temperature internal friction studies which are to be continued in a vacuum apparatus now being built in the shop.

Process Assistance Activities

During the month a study was made of the condition of pump shafts in 190 C high head pumps. The investigation was made using a Sperry Reflectoscope. Results as yet are inconclusive, but indications point to a possibly severe flaw in one shaft.

COATINGS AND CORROSION

Corrosion of 2S Aluminum

A logical step in studying the mechanism of aluminum corrosion in hot water is the determination of the corrosion rate with respect to time as precisely as possible. A test was initiated in July in which a group of 99.45 percent aluminum samples were placed in flowing tap water at 90 C $\pm$ 1 C. Samples were removed once a day for the first week and once a week thereafter. Thus far, the

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corrosion rate has been determined over a four week period. During the first five days of exposure, the weight loss rises linearly to 118 mg/dm². At this point there is a rapid decrease with a much lower linear rate extending from seven days on. There is a total weight loss of 125 mg/dm² at the end of four weeks. Exposure of 99.45 percent aluminum in the 90 C trough in the 200 East flow laboratory gave a total weight loss of 767 mg/dm² at the end of 30 days. It is possible that the formation of CaCO₃ boiler scale, which is being observed in the present studies, is responsible for the rapid decrease in the rate of weight loss and the lower values of total weight loss. Boiler scale formation in 300 Area water is of major significance as was demonstrated recently when ten feet of 3/8-inch heat exchanger tubing was completely plugged after twelve days operation at 150 C.

In order to determine the nature of the beneficial effect of an autoclave film on the corrosion of aluminum, a test has been initiated to determine the corrosion rate of autoclaved aluminum samples. Tests have also been initiated to determine the effects of surface treatment and heat treatment during autoclaving on the corrosion rate.

The most convenient method of analysis for the determination of the aluminum content of the corrosion product film formed during the 90 C exposures, uses anion exchange resin. The available anion exchange resin has been found to be contaminated with aluminum and the film analyses are awaiting receipt of special low aluminum resin.

Intergranular Corrosion

Intergranular corrosion weakens the metal, so tensile strength should be a measure of this attack. To test this method of measuring intergranular corrosion, samples of six aluminum alloys (53S-H34, K-155, 61S-T6, 75S-T6, 2S-H14, and 99.45% aluminum) were cut from cold rolled sheet, and exposed to flowing 300 Area tap water at 150 C. Half of the specimens were removed after one week, stripped, and cut into tensile specimens. The tensile strengths were measured and compared with the tensile strengths of uncorroded specimens of the respective alloys. Only the 75S alloy showed loss of tensile strength but this alloy did not show any drastic corrosion. It is possible that this alloy lost strength by annealing, so other specimens were "annealed" at about the same temperature and will be tested. The other half of the specimens were removed after 12 days and will be processed as the shop and testing facilities permit.

These experiments were slow, inconvenient and are not well adapted to cans. In order to give some information on the corrosion characteristics of cans, a bursting strength apparatus was set up to test cans. Since the cans are fully annealed in the canning process, a study was made of the annealing. Cans annealed from 3 to 40 minutes at 600 C showed bursting strength in a very narrow range, from 675 to 685 lbs/sq. in. Large grains could be grown by annealing, stretching the cans slightly, and re-annealing. Annealed cans will be tested for intergranular corrosion as soon as a new heat exchanger is installed.

Fuel elements have been examined for intergranular corrosion by Radiometallurgy Unit. There is no evidence to say whether hot pressed slugs are more or less susceptible to intergranular corrosion than Al-Si canned slugs. A report(1) on intergranular corrosion of different types of fuel elements has been written.

Corrosion Testing Equipment

A new autoclave is under construction in K Area. It will be 20 gallon capacity, operated from 100 C to 200 C and have a flow rate of 2 gal/min. Any of the various waters available at the KE Semi-Works can be used. The autoclave has been located, scoped, designed, and the purchase requisitions approved. The autoclaves in 3732 are now operating. The glass autoclaves in 314 have been tested under steam pressure. After minor changes to the traps, they will be ready for service. One high temperature autoclave has been operating on flow at 350 C for ten days.

Six preliminary test reaction vessels have been purchased and will be used for preliminary study or for tests where it is important to bring a system to and from temperature rapidly. These are essentially small bombs which can be placed in an oven and removed and quenched. They will be valuable for service work as, for example, testing zirconium welds.

Anodizing

The two tubes from PT 519 containing anodized slugs were discharged May 19 after 135 MWD/T exposure. It was necessary to discharge these tubes because a change in pile operation would have made these tubes pile limiting. These two tubes have just been examined after cleaning in 5% phosphoric-2% chromic acid solution. The maximum water temperature during operation was 117 C. The surface temperature was estimated to have been from 160 C to 170 C. The anodized pieces in the rear and central parts of the tube were severely checked. The aluminum at the base of the cracks did not appear to have been attacked, except for two slugs which had been anodized in sulfuric acid. This checking was probably caused by having a film that was too thick. In one or two pieces, the anodized film was preferentially attacked on the bottom half of the slug. This is a new effect and may have been caused by imperfect centering. The tube will be examined to find out whether the ribs have been worn down to such an extent that the size of the annulus in the bottom half of the tube was decreased to any considerable extent. The tubes are being recharged with additional anodized slugs.

This charge will include pieces anodized in oxalic acid and sealed in distilled water at 170 C, and pieces anodized in either sulfuric or oxalic acid and sealed at 280 C in water containing silica gel. A thinner (1 mil) film will be used on these pieces.

(1) HW-38834, "Re: Intergranular Corrosion of Fuel Elements," C. Groot, August 22, 1955

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Uranium Pickling

The initial laboratory investigations of the rate controlling factors in uranium pickling have been completed. It was concluded that:

1. A minimum of 0.1 mils of uranium must be removed to obtain a clean surface which will not reoxidize in less than three hours.
2. Spray pickling in the present machine is slower because:
 - a. Nitrous acid is a catalyst, essential to obtain rates adequate for production.
 - b. The sprays remove all detectable nitrite ion.
 - c. Phosphoric acid catalysts, the only known catalyst compatible with the stainless equipment, will give an adequate rate but does not give a clean stable surface.

A pilot model spray chamber has been installed in the 314 Building and experiments will be conducted to determine:

1. The feasibility of retaining NO₂ in the system in a high enough concentration to give a high rate of pickling.
2. Suitability of other catalysts.
3. The stability of a uranium surface after 0.1 mils have been removed by spray pickling.
4. The effect of retention time between pickling and rinsing upon the stability of the uranium surface.

It is anticipated that this information may be useful in redesigning the production pickling machine to obtain proper processing.

Equipment for Electroplating Pilot Plant

Tanks. The proposed program indicates that the amount of anodizing work will increase in the near future. Four stainless steel tanks have been fabricated and installed for use in the pretreatment operations of the anodizing process.

Racks. The present anodizing racks are not considered satisfactory for pilot plant operation. A rack development program has been initiated in an effort to find a simple, easily operated, easily fabricated rack for anodizing.

Instrumentation and Control. A Magnegage and current density meter have been purchased to assist in the plate distribution study. The Magnegage is a device for nondestructively testing the nickel plate thickness. The current density meter will enable the operator to determine the current density on various surfaces of a piece. Neither of these instruments has been evaluated at this time.

Copper Plating on Uranium

A request was received to plate ten mils on the surface of the inner bore of four extrusion billets measuring 12" long X 7" O.D. X 1 7/16" I.D. Experiments to date using the acid copper sulfate bath and plating on eight-inch solid uranium pieces have not been successful. After 12 to 24 hours, the plate is blistered and in some cases loose corrosion products are present in these blisters.

Service Work

The service work done by the Electroplating Laboratory is tabulated below:

<u>Plate and Thickness</u>	<u>Base Material and Size</u>	<u>Number Plated</u>	<u>Purpose</u>
Nickel. 3-8 mils	Lead "door knobs" 2 1/2 inches diameter	9	Development of procedures for mechanically removing nickel-plated from a lead-like material. Work to be done off-site.
Nickel, 2 mils	Cu cylinder 4 inches diameter by 24 inches. Split lengthwise	2 half cylinders	Thermocouple calibration work by instruments group. Plating is to prevent copper oxidation at elevated temperatures.
Nickel, 5 mils	Al wafers 4 inches diameter by 1 1/4 inches thick	12	Heat transfer studies by Pile Coolants Studies Unit.
Chromium, 2 mils	Stainless steel Indexing wheel for charging machine	1	Prevent marring slugs as they are charged, 100 Areas.
Chromium, 2 mils	Stainless steel tongs	1	Protect tongs while in molten Al-Si.
Chromium, 1 mil	Nickel-plated Brass 2 1/2 inches by 6 inches	1	Plating experience and information. Brass was nickel plated and then chrome plated.
Nickel	Wafers	240	Development of new slug by Fuel Assembly Unit.
Nickel	Wafers	180	Material for I & E wafer slugs for MTR test.
Anodized Film	NAA pieces	20	
Anodized Film	Aluminum sheet	73 sq. ft.	For punched wafers for Al-Si wafer slug. (Fuel Element Development Unit).

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Anodized Film

Aluminum sheet

6 sq. ft.

For punched wafers for hot
pressed wafer slug. (Fuel
Assembly Unit)

Insulated Coatings

Ceramic Coating. KAPL has developed a procedure for applying an enamel for uranium slugs. In this procedure the uranium is passivated by electropolishing and the enamel is applied with a brush. Two samples have been received from KAPL; on both samples the enamel appeared uniform and very adherent. Attempts to duplicate these results in the laboratory here have met with little success so far. The enamels crack and peel in almost every case. This is due, probably, to the method of application or to the baking procedure. KAPL was visited during this month and the enameling procedure was studied. At KAPL the enamel is applied with an air brush and baked under rigidly controlled conditions. At present, the success of the procedure depends upon the experience and training of the operator. The equipment for applying and baking these enamels will be patterned after those at KAPL and further attempts to duplicate KAPL results will be made during this next month at HAPO.

Anodic Coatings. The insulating film on the slug may be applied by anodizing an aluminum sweater and canning the entire assembly in a regular aluminum can. Six dummies have been anodized and will be canned and subjected to temperature cycling. Various tests will be performed to evaluate this anodic film as an insulating layer.

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HW-38828

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PHYSICS RESEARCH SUB-SECTION

REACTOR PHYSICS

An attempt has been made to measure the critical mass of the Lattice Testing Reactor in an exponential pile loaded with J-slugs. J-slugs, which have approximately the same U-235 content per unit length as LTR fuel elements, were loaded in a hollow-cylindrical pattern and a multiplication of about 10 was achieved. There were no slugs covering the open ends of the hollow cylinder as there will be in the LTR. The array was found, by extrapolation of the multiplication curve, to be critical at 10.5 kilograms -- within 7 per cent of a value calculated by small source theory. Small source theory predicts a critical mass of about 8.2 kilograms for the LTR. The partial verification of the theory in the above experiment adds confidence to this estimate of the LTR critical mass.

The assembly and mechanical and electrical testing of the LTR is essentially complete. The drop-time of the vertical safety discs is found to be 0.7 seconds; the time for the control rods to snap closed is 0.15 seconds. Bouncing of the control rods, after closing, has been found. This amounts, at most, to 20%, and persists for a time of 0.33 seconds. Fuel for the reactor has been received and start-up is expected to begin in September.

Measurements of the buckling of lattices loaded with 1.175" diameter slugs were completed with the dry 7" and 10-3/8" lattices. The values obtained are 115.6 and 56.6 ($\times 10^{-6} \text{ cm}^{-2}$) for the 7" and 10-3/8" lattices respectively.

The buckling of a J-slug lattice of 10-3/8" spacing was also measured. The results are $668 \pm 15 \times 10^{-6} \text{ cm}^{-2}$ for the wet lattice and $710 \pm 15 \times 10^{-6} \text{ cm}^{-2}$ for the dry.

A quantity of slugs, sufficient for exponential experiments, has been received. These slugs are made of uranium enriched to 1% of U-235. They have been canned and will now be used to study enriched lattices.

The temperature in a pile varies strongly from point to point. When attempting to relate reactivity to temperature in temperature coefficient studies, the problem arises of what type of average temperature is it appropriate to use. This problem has been studied and the results have been turned over to the pile physicists.

A new expression has been found for the resonance escape probability of a lattice. This expression is simpler to use than existing relations and is expected to be more accurate.

NUCLEAR PHYSICS

Work has started in the Design Section on a new neutron spectrometer to be installed at KE-Pile.

A single crystal of lead, 3" x 4" x 0.25" in dimensions, was successfully grown. This crystal will be used to diffract neutrons in a spectrometer.

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Difficulties are being encountered in making BF_3 counters which are not temperature dependent. The counting rate of a BF_3 counter of the usual design is found to depend rather strongly upon the temperature. In attempting to overcome this dependence, various insulators, and baking out and filling techniques are being used. So far, a successful counter has not been made.

PHYSICS PROBLEMS CONNECTED WITH PLANT OPERATION

A study of the sumps in the "Purex" process has been made and critical mass limits determined.

The mass limits that would have to be imposed if enriched uranium were to be processed in the separations plants are being worked out.

METALLURGY RESEARCH SUB-SECTION

Fundamental Studies

The problem of determining the nature and mechanism of radiation induced changes in uranium can conceivably be attacked by a high resolution examination and study of the microstructure of irradiated uranium. Developmental work in the use of cathodic vacuum etching and subsequent Faxfilm replication of irradiated uranium has progressed to the extent that replicas have been examined optically and in the electron microscope with essentially no radiation restrictions being imposed. Although no obvious microstructural changes are apparent in the replicas of irradiated uranium from a statistical standpoint, the re-examination after irradiation of select areas on the metallographic surface of precharacterized test specimens now being irradiated should provide the necessary basis for detecting and interpreting radiation damage effects to the microstructure of uranium.

In-pile autoradiographs of thorium-uranium specimens, thorium-uranium-zirconium specimens and thorium-uranium-titanium specimens have been prepared and examined. The resolution afforded by this autoradiograph technique was not sufficient to permit a direct comparison of the optical microstructure with the radiographic structure. The data suggests, however, that the solubility of uranium in thorium is at least as extensive as that reported previously. The addition of zirconium and titanium to the Th-U alloys to reduce uranium solubility in thorium has not been successful.

Mechanical and Physical Properties of Fissionable Materials

A small tensile testing fixture was developed in collaboration with Dr. J. Washburn to permit microscopic viewing of a tensile specimen while it is being strained. The tensile fixture is mounted on a Bausch and Lomb metallograph, and the specimen, after being polished and cathodically etched, can be viewed through the microscope. Photographs of individual grains taken at various stress levels showed twinning, deformation, and the final fracture of the uranium specimen. It was interesting to note the almost instantaneous oxidation of the grains due to the strain energy released upon fracture of the specimen. This difference in oxidation between individual grains was shown by different colors, from yellow to red to blue, dependent on the orientation of the grains when viewed with polarized light. A motion picture camera is being mounted on the Bausch and Lomb metallograph to obtain rapid recording of the deformation taking place.

Reactor Structural Materials

The notch bend test is used to evaluate the mechanical properties of zirconium and its alloys, and a notch root radius of 0.001 inch was chosen arbitrarily as a standard. A series of tests with notches of different radii revealed that this was a fortunate choice because below a radius of 0.0015 inch, the radius has no further effect on the bend test and below 0.0005 inch the notching tool becomes too fragile for repeated use. The limited number of tests that were made revealed an interesting relation between the fracture angle, theta, and notch depth, d, applicable to Zircaloy-2 specimens about 0.060 inch thick and 0.35 inch wide. This relation is: $\ln \theta = 2.4 \pm m(14-d)$ where theta is the fracture angle in degrees,

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m is a constant, and d is the notch depth in thousandths of an inch. The formula appears to hold for all conditions of cold work and notch root radii. The constant, m , is different for each cold work condition and root radii above 0.0015. It can be seen that when $d = 14$, all the various heat treatments and notch root radii have a characteristic fracture angle of 11 degrees bend.

The notch bend tester has been adapted to constant load stress rupture and creep testing. This adaptation has also made it possible to obtain constant strain rate bend test data through a wide range of strain rates.

Reaction kinetics of zirconium and Zircaloy-2 in dry air have been established at temperatures of 500 to 700 C during the past several months. The weight gain was found to vary as approximately the cube root of the exposure time for the first several hours; the rate then increases, the weight gain becoming a linear function of time. During the exposure two processes are in operation simultaneously: one is the formation of zirconium dioxide; the other, which is not apparent to the eye, is the solution of the oxide in the metal. Since one sees an oxide layer on the specimens, it is obvious that the formation process is the more rapid, at least for the first several hours of exposure. An experiment intended to indicate qualitatively the rate of solution of the oxide produced quite unexpected results, as follows. Four identical specimens of sheet Zircaloy-2 were heated in dry air at 600 C for six hours; the transition to the faster rate occurs at about eight hours for this alloy and this temperature. Weight gains measured intermittently during this exposure were nearly identical for all specimens and approximated an average curve obtained in previous work. Three of the specimens were heated in a good vacuum at 600 C for four, eight, and sixteen hours, respectively. After this treatment the specimens were metallic in appearance. Heating in dry air was then resumed for all four samples. The control, unannealed in vacuum, behaved normally. The other samples, however, gained weight extremely rapidly, with the rate progressively increasing with increasing vacuum annealing times. The piece which was vacuum-annealed for sixteen hours gained twice the weight per unit area as the unannealed piece after a total exposure of twenty-four hours. Although these results are preliminary and unconfirmed, there seems little doubt that the corrosion rate in air is greatly accelerated by vacuum-annealing of oxidized zirconium. Four additional specimens of Zircaloy-3, exposed at 600 C (1110 F) in dry air, reacted at a rate intermediate between those previously observed for zirconium and Zircaloy-2. This is in agreement with similar tests at 700 C.

Fuel Materials

Sixteen Zircaloy capsules containing compressed UO_2 powders of various packing densities and isotopic compositions have been irradiated in the MTR and have been returned to HAPD for examination. These capsules were irradiated under conditions such that the maximum core temperatures were calculated to be as high as 2850 C. The maximum exposure attained by these specimens was approximately 1500 MWD/T. Preliminary examination of the capsules shows no dimensional changes. Equipment is being fabricated for analysis of the gas content of each capsule. The capsules will eventually be sectioned for study of the sintering effects caused by high temperature operation.

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Metallurgy Research Sub-Section

An UO_2 slug, 1.285" diameter and 4.00" long, sintered to 84 percent of theoretical density, has been jacketed in a 0.075" thick Zircaloy can and has been charged into the MTR fuel element test facility for irradiation. The power level has been chosen so that the maximum temperature calculated to be reached in any part of the slug will not exceed 2000 C. This requires a maximum specific power of 22 kw/ft (fission plus gamma heating). Due to the nature of the MTR flux pattern, a severe temperature gradient will exist in the slug longitudinally as well as radially. This fuel element and similar slugs will be subjected to increasingly higher power levels in subsequent cycles, barring previous failure. Several pieces of sintered UO_2 of 85-90 percent theoretical density are being machined to 0.500" diameter x 4.00" long. These are to be used in a group of cluster rod fuel elements to be tested in the recirculating high temperature water loop at 100-H Area.

A study of the reaction kinetics between hot (300 C) water and uranium metal heated 300-400 C above water temperature has been initiated. In the initial experiment with the high pressure loop facility, bare uranium heated to 660 C was allowed to react with water heated to 280 C flowing past the specimen with a velocity of approximately 16 feet per second. At the instant of reaction, pressure in the loop increased from 1575 psi to 2050 psi. Automatic shutdown of the loop and failure of a valve gasket were the only adverse effects noted. No shock wave was generated. The specimen was in contact with water initially at 280 C and cooled to a final temperature of 65 C during a period of 15 hours. The specimen was intact and had suffered a weight loss of 8.9% after removal of the oxide film. In a second experiment uranium heated to 660 C was allowed to react with water at 300 C. In this experiment the uranium specimen was electrically heated for three minutes after the water had been introduced into the reaction chamber. The specimen remained in contact with water for 17 hours, with the water temperature being above 200 C for two hours. During the experiment the specimen is clamped between two copper electrodes. The specimen, initially 3/8 inch in diameter, had been almost completely cut apart adjacent to each electrode. The center section of the specimen, which had been at the highest temperature at the instant of reaction, was intact. Diameter measurement of the center section after removal of oxide indicated that this section had lost about 25% in volume. It seems possible that the center section was protected by an oxide film of a different nature than that formed on low temperature metal. R.A.U. Huddle has reported in AERE-M/R-1281 that the uranium steam reaction is similar in nature; a protective oxide coating being developed when steam temperatures above 450 C are utilized. In the next series of experiments the behavior of heated uranium specimens will be compared with that of uranium specimens at ambient water temperature.

A total of 19 bomb reductions was performed during the month to study the various parameters of importance in bomb reductions and to aid in clarifying the reaction mechanism of a calcium reduction of UO_3 . The effect of ignition temperature of the bomb charge on the resultant particle size was determined. Maximum particle size was obtained at ignition temperatures of approximately 335 C. Subsequent experiments, performed to determine the role of iodine as a booster to small scale bomb reductions, indicate that the addition of small amounts of iodine raises the ignition temperature appreciably. It is postulated that the iodine reacts with the calcium to form solid CaI_2 . Thus, the UO_3 and calcium are prevented from interacting until the melting point (575 C) of CaI_2 is reached. Several bombs were fired using molten calcium in the bottom and UO_3 on top. These bombs are

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HW-38828

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Metallurgy Research Sub-Section

characterized by a pre-ignition heat pulse occurring when the reaction between calcium and oxygen occurs. For all practical purposes the reaction then becomes one between U_3O_8 and calcium. Experimental reductions using this process proceeded fairly smoothly and gave fair yields of uranium metal.

Fuel Element Evaluation

Two cored insulated slugs are being irradiated at the MTR, one having the cored uranium plugged with welded uranium end plugs and one having a uniform core without end plugs. The slugs are insulated by four mils of Al_2O_3 on the interior surface of the can. Zirconium disks were placed at each end of the uranium, and in the case of the open uranium cylinder, the zirconium disks served to prevent flow of aluminum into the core during the cold canning process. Calculated operating temperatures for these slugs at the observed specific power of 65 kw/ft are 380 C uranium surface temperature and 790 C maximum uranium temperature. The slugs will have accumulated about 750 MWD/T exposure at the end of the month. They have been measured three times during the irradiation. It seems probable that the initial increase of about one percent in the length and diameter of the canned fuel elements arises from thermal expansion of the uranium. The absence of further expansion upon additional irradiation appears to bear out this conclusion. The slugs will be irradiated for one further MTR operating cycle and are scheduled for discharge on or about Sept. 12.

A mechanically bonded, solid uranium slug is being irradiated in the MTR fuel element testing facility. The slug is operating at an estimated 65 kw/ft heat generation of which an estimated 8 kw/ft is due to gamma heating. The slug has been measured three times during the course of irradiation. The measurements after 600 MWD/T indicate rather severe distortion of the can with little change being noted at 90 MWD/T and 200 MWD/T. Examination of the slug in the MTR canal gave no evidence of localized bumping of the aluminum such as might be expected if water penetration and corrosion of the uranium had occurred. The slug has been removed from the testing facility and will be returned to Hanford for examination.

The initial calculations for the stress distribution in a coaxial fuel element design have been completed. The method of analysis and numerical results will be published soon. The fuel material in the proposed fuel element is divided into two hollow cylinders separated by an insulating layer. Based on an analysis of the elastic behavior of the material, significant reductions of circumferential stresses in the outer cylinder, as compared to the conventional cored slug, are predicted. Further reductions in the stresses of the coaxial fuel element can be obtained if gamma phase operation of the inner cylinder is obtained by insulation or provision of a sufficient gap between cylinders. Such a fuel element has been designed and is being fabricated for testing in the MTR.

Fuel assemblies containing four spaced rods in the form of a cluster have been fabricated. Increased heat transfer surface and less danger of tube blockage by rupture are the principal design features of such fuel element assemblies. One assembly containing one intentionally defected aluminum clad uranium rod and three aluminum rods was ruptured in 260 C water. This fuel element was designed to fit the prototype KER size process tube. The ruptured rod expanded to touch one adjacent rod, but no pressure drop was observed, and the flow rate of water was essentially unchanged. Similar experiments with defective solid slugs that were ruptured

Metallurgy Research Sub-Section

in standard process tube sections have resulted in a complete blocking of water flow. The effective annulus in the KER tube design is larger than that in a standard process tube, and the reduction in flow due to a rupture is correspondingly less severe than in the case of a standard coolant annulus. The results of rupturing two rods of a four element cluster simultaneously will be available shortly. Similar four element clusters are being fabricated for in-pile testing in the 100-H pressurized loop facility and in the MTR.

A drilled HAPO size uranium-magnesium matrix fuel element has been run in the rupture study flow laboratory. The water temperature was 105 C. After 20 hours, some swelling was observed. After 43 hours, the slug was stuck in the tube, and the water flow was greatly restricted. No pressure drop data across the flow tube was obtained. A HAPO size enriched uranium-magnesium matrix slug is to be irradiated through one cycle at the MTR before loading of the HAPO size matrix pieces in a 105 Pile.

Radiometallurgy Examination

The examination of the four unruptured, unbonded-point closure slugs from Tube 1073-H (PT-105-580-A) continued. One slug (No. AR-18) was sectioned longitudinally in order to observe the effect of the large diameter increase (44 mils) which was found near the base end on the shape of the uranium. This sectioning revealed that the end of the slug had become slightly dished, and that a noticeable increase in diameter started approximately 0.1 inch from the can base-uranium interface. Two small macro cracks were observed near the axis of the slug. A second slug (No. AR-16) was mechanically stripped in order to give some indication of the extent of bonding which may have occurred between the jacket and uranium during irradiation. The jacket was stripped quite easily, indicating no jacket-uranium bond. However, many small light-colored spots were found over the entire uranium surface and are assumed to be particles of aluminum which were torn from the jacket during stripping. This would seem to indicate that some aluminum-uranium diffusion may have occurred at discrete points. The entire surface of the uranium was visibly roughened or bumped -- apparently by uranium distortion resulting from irradiation. The formation of these small bumps may have provided sufficient contact between the uranium and aluminum to allow diffusion to take place. Before any definite conclusions concerning U-Al diffusion can be reached, metallographic examination will have to be performed.

Examination of the two unruptured, unbonded-point closure slugs from Tube 2061-C (PT-105-584-A) continued. Two small samples were cut from the jacket of the stripped slug (No. 1294) for autoradiography, chemical analysis, and metallography. Autoradiographs were taken of these samples in an attempt to reveal the presence of small localized hot spots which may have resulted from the diffusion of uranium into the jacket. Although this test gave no indications of hot spots, it cannot be concluded that diffusion did not occur because any diffusion product formed in the jacket may have been torn from the jacket and remained attached to the uranium core during stripping. Metallographic studies of the wrinkled areas previously reported and chemical analyses are not yet complete. Metallographic examination of a section taken from the jacket of the second slug (No. 1295) has been completed. This section was taken longitudinally through one of the large "wrinkles". This "wrinkle" was found to consist of two V-shaped notches, the largest of which was approximately 8 mils deep, in the outside surface and a configuration similar to a geologic uplift on the inside which was displaced approximately 35 mils from the notches. The flow lines in this area indicate the wrinkle was formed during the sizing of the jacket

Metallurgy Research Sub-Section

to the core. No evidence of U-Al diffusion was found in this section. Hardness tests and metallography on wafers taken from the centers of both of these slugs indicate that they did not operate in the beta phase.

Work was renewed on Failure No. 360 which was discharged from Tube 2772-C on May 3, 1954, after an exposure of 694 MWD/T. Preliminary examination was performed last year as part of an investigation of PT-25M failures. The present interest in the intergranular corrosion of aluminum slug jackets prompted further investigation of a pronounced hot spot which had been observed surrounding a large hole near the base end and a peculiar particle which was found loosely attached to the core directly underneath this hole. Metallographic examination of transverse cross-sections of the jacket in the hole revealed that very severe intergranular corrosion had occurred at the edge of the hole. The severity of this attack gradually decreased as the distance from the hole increased, until it entirely disappeared approximately 3/4 inch from the edge of the hole. Particles of what appeared to be a uranium-aluminum diffusion product were attached to the inside surfaces of the jacket sections. The large particle which was found attached to the uranium core directly underneath the hole has been positively identified as the compound UAl_3 by x-ray diffraction analysis.

Detailed examination of a low exposure production slug failure (No. 471) from Tube 0969-C revealed that intergranular corrosion had penetrated the aluminum can. As was observed on a similar failure from 100-H, the intergranular corrosion was found within an area on the can surface that appeared to have had subnormal cooling. On Failure No. 471, there was also evidence that diffusion between the uranium and AlSi had been active. This possibility is being further investigated in hopes of estimating the temperature range to which the jacket was heated.

The examination of the slugs and tubing from 4669 KW was completed. The composition of the uranium-aluminum diffusion product that surrounded the slugs was found to be essentially the same throughout the tube where elevated temperatures had persisted for longer than a few minutes. The composition appeared to have stabilized near that of UAl_3 . The uranium castings that were removed from between the pile graphite blocks, and which proved to be pyrophoric when handled in air, were found to contain 0.028 percent aluminum as the only abnormal impurity, which was present as fine stringers of a compound in the uranium matrix.

Separations Plant Structural Materials

Curves depicting the relationship between time and corrosion rate at 145 C and temperature and corrosion rate from 80 C to 170 C have been developed for sensitized AISI Type 304L stainless steel in synthetic Purex 2WW solution. The corrosion test exposures were made in sealed glass capsules identical to those used in the factorially designed static corrosion tests. During the time versus corrosion rate study, the corrosion reached the equilibrium rate after about 72 hours and remained constant throughout the duration of the study, 308 hours. The temperature versus corrosion rate curve showed a smooth exponential increase in corrosion rate ranging from 0.00004 to 0.0350 inch penetration per month with increasing temperature. Duplicate specimens were used to determine each point, and these duplicates exhibited variations of approximately ± 10 percent.

Metallurgy Research Sub-Section

A pressurized heat transfer unit has been built to correlate corrosion rates obtained from atmospheric pressure heat transfer units and sealed glass capsules at elevated pressures used in the factorially designed static corrosion tests, and to evaluate the effect of heat flux on corrosion rate. This unit permits variation of the heat flux between the sample and the solution by pressurizing the entire unit and superheating the solution. Shakedown exposures are being made under the following conditions: sample at 125 C, solution at 105 C; sample at 125 C, solution at 125 C; and sample at 125 C, solution at 145 C. This unit will be used to separate and compare the effects of solution temperature and heat flux on corrosion rates of heat transfer surfaces.

Metallurgical Laboratory Examination

A visual examination of a thermocouple well removed from the Recuplex dissolver subsequent to the failure of the thermocouple, revealed severe local pitting in an 8-inch length near the lower end of the thermocouple well. The well, which consists of a 1/4-inch pipe about 36 inches long, had been perforated, allowing acid to attack the thermocouple. Portions of the thermocouple well are being sectioned for metallographic examination to determine the nature of the corrosive attack. Since the dissolvers are presumed to be made of the same type material as the thermocouple wells, the results of this examination may indicate the necessity of early replacements for the Recuplex dissolvers.

As part of the continued investigation of plant service failures, the tube bundle from the TD-4 acid fractionator, 224-U Building, was examined subsequent to its removal August 19, 1955. This tube bundle was removed because of the severe local pitting which caused leakage around the gasket and through the bolt holes. The type 304L tubes welded with type 308L welding alloy in this tube bundle have had approximately 21 months' cumulative service in 25 to 50 percent nitric acid as compared to an average of three to four months' service of the type 347 and type 309SCb tube bundles used previously in 40 to 60 percent nitric acid. Examination of the several established reference points on the tube bundle revealed the progressive corrosion to be very uniform and of a low order of magnitude. The type 347 tube sheet had corroded to approximately 1/32 of an inch greater depth than the type 308 L welds between the tubes and tubesheet. It is believed that this tube bundle would serve for several more months if the gasket faces can be repaired or if the tube bundle could be welded into the reboiler.

A prototype flexible connector, manufactured by the Resistoflex Corporation and consisting of a teflon tube with a stainless steel wire braid sheath, failed after eight months' service on the rear face of C Reactor. The failed connector was submitted to the Corrosion and Welding Unit for examination, along with intact samples of a prototype connector and a slightly modified version of this same connector. Examination of the failed connector revealed that failure had occurred through stress corrosion cracking of the braided wire sheath. The standard stress corrosion cracking test, boiling 42% MgCl_2 , revealed that the wire used in the fabrication of both the braided sheath of the prototype connector and the current production connector is extremely susceptible to stress corrosion cracking. Comparable service data are not available, but the failure of the prototype in service was complicated by the application of a coating of Saran which completely covered the entire braided wire sheath and which may have been a contributing factor in the early failure of the braids.

Metallurgy Research Sub-Section

DECLASSIFIEDPlutonium Metallurgy

Several large alpha plutonium castings were made during the past month in graphite molds having a thin protective magnesia-sodium silicate wash on all surfaces contacting molten metal. The molds were heated to 400 C to prevent cold shuts and were side gated on a tangent to the curved surfaces in order to obtain smooth filling of the mold and to minimize thermal gradients. Non-metallic inclusions have been effectively eliminated by first filling the pouring cup with molten metal and then removing a graphite stopper from the sprue opening in the bottom of the cup. This system also assures a uniform flow of metal into the mold under a constant head so that the possibility of cold shuts has been eliminated. Non-uniform shrinkage was obtained in one casting due to the inability to remove an internal graphite core as planned while the metal was in the delta range, thus causing radial shrinkage to be restrained by the graphite core.

Work is continuing on the fabrication of preformed nickel shells for complex plutonium shapes. The shells are being made by plating nickel from an all chloride electroplating bath on low melting bismuth-tin alloy mandrels. The mandrels are removed by melting the alloy under silicone oil leaving the nickel shell. Considerable difficulty was experienced in obtaining a uniform nickel plate on the interior of a mandrel. The main causes of difficulty were impure anode material and, also, improper spacing and geometry of the anodes. A bagged anode was inserted in the cavity as well as a small aerator to sweep the surface free of gas bubbles. Electrolytic nickel was not available, and a substitute was used in its place. Impurities in the substitute nickel would passivate its surface and thus reduce the current flow through the bath. Carbon and other foreign material would work their way through the bagging material and cause roughness of the plate. This difficulty was overcome by plating the shaped anodes with electrolytic nickel. This method worked very satisfactorily although considerably more time was consumed in this process. Correct positioning of the anodes is important in obtaining a uniform plate and, also, the amount of exposed anode surface. These variables were adjusted by trial and error until a satisfactory plate was obtained.

Long, small diameter, nickel coated holes are required for flux monitoring purposes in some of the U-Pu alloy PCTR slugs. The holes have to be precisely positioned parallel to the slug axis and at varying radial distances. They are to receive Al-Pu alloy monitor pins or wires. Since these holes are too small to be drilled, an attempt was made to produce them by casting uranium-plutonium alloy around wires of the right size and then withdrawing the wire. One wire each of copper, molybdenum, stainless steel, and platinum were drawn to 11 mils diameter. These four and a seven-mil diameter tungsten wire were nickel plated in an electroless nickel plating bath. Iron was used to catalyze the reaction. The bath used was 30 g/l nickel sulfate, 10 g/l sodium hypophosphite, and 50 g/l sodium glycolate in aqueous solution. The plating temperature used was 90 C. A two-mil coat was deposited. Uranium was cast around these nickel coated wires in vacuum. Metallographic examination of the casting shows thermal shattering and diffusion of the nickel coating almost to complete dissolution. The copper and stainless steel were attacked by the molten uranium. None of the wires were extracted from the casting. It is possible that the more refractory metals may have been pulled from the casting leaving a small nickel coated hole.

CONTACT ENGINEERING UNIT

PROJECT ACTIVITIES

Project CG-558

One Project Representatives' Meeting was held during August. Three scope items were approved as follows:

1. "Resistoflex" pigtails for the front face of B, C, D, DR, F, and H.
2. Replacement of the crossheader strainers at DR and H with ones of 400 psi ASA rating.
3. Replacement of the butterfly valves in the 190-H tank lines.

As of August 26 the construction phase of project CG-558 was estimated to be 21% complete. The horizontal rod replacements have been completed in all areas.

Project CG-578 (Gamma Monitoring)

The Gamma Monitor installation was completed at 105-H during the horizontal rod outage. The next installation will be at DR.

Project CG-600

The revised proposal has been approved locally and sent to Washington for AEC approval.

Zone Temperature Monitor

Cost estimates for the installation have risen to the point where it will not be possible to finance it from the Manufacturing Department Miscellaneous Projects Budget. Arrangements are being made to finance it from CG-558 funds since it is now estimated that there will be money left in this project.

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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, 1955, 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

G. W. Stuart

Title

A Method for Obtaining a Prompt
Negative Reactor Coefficient of
Reactivity.

Reported 8-24-55

Manager - Pile Technology
ENGINEERING DEPARTMENT

VISITORS AND BUSINESS TRIPS

G. Watt, Consultant, of the University of Texas, Austin, Texas visited Hanford on 8-1 thru 8-5-55 for technical consultations.

G. L. Stukenbrocker and J. W. Robinson of the National Lead Co., Cincinnati, Ohio visited Hanford on 8-8 and 8-9-55 to investigate x-ray and spectrophotometric analytical methods.

E. Fredricks of Oak Ridge National Laboratory, Oak Ridge, Tennessee visited Hanford on 8-4 and 8-5-55 to discuss laboratory shielding problems.

Lt. Col. Wm. T. Woodyard, Lt. Col. Julius L. Yucker, Jr., Lt. Col. Wm. H. Stephens, Maj. Ronald M. Howard and Maj. John N. Robinson, Jr. visited Hanford on 8-9-55 to discuss Hanford separations processes.

A. T. Gresky and R. P. Wischow of Oak Ridge National Laboratory, Oak Ridge, Tenn. visited Hanford on 8-11 and 8-12-55 to discuss thorex chemical processing.

C. Leader and A. Pachukas of the Engineering Service Division, New York, N. Y. visited Hanford on 8-18-55 to discuss engineering development problems.

R. E. Tomlinson of Hanford visited the British Atomic Energy Establishment in Harwell, England to inspect the facility on 8-25 and 8-26-55.

ORGANIZATION AND PERSONNEL

	<u>July</u>	<u>August</u>
Separations Technology General	2	2
Plant Processes Sub-Section	60	58
Chemical Development Sub-Section	82	80
Chemical Research Sub-Section	62	62
Contact Engineering Unit	6	6
Analytical Laboratory Unit	34	33
Technical Shops Unit	30	31
	<u>276</u>	<u>272</u>

Plant Processes Sub-Section: E. F. Kurtz, Engineer I transferred to Pile Technology Section on 8-1-55 and R. L. Ring, Engineering Assistant transferred to Pile Technology on 8-8-55.

Chemical Development Sub-Section: R. H. Moore, Sr. Engineer transferred to the Chemical Research Sub-Section on 8-22-55.

Chemical Research Sub-Section: D. S. Boice, Secretary G transferred to the Project Section on 8-5-55. R. H. Moore, Sr. Engineer transferred to the Chemical Development Sub-Section on 8-22-55.

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Analytical Laboratory Unit: D. M. Hunnicutt, Engineer II transferred to the Project Section on 8-15-55.

Technical Shops Unit: Wyoma J. Baker, General Clerk "D" hired into the Unit on 8-24-55 and Helen W. Gardner, General Clerk "A" hired into the Unit on 8-8-55. Olinda M. Madden, General Clerk "B" terminated on 8-12-55.

DECLASSIFIEDPLANT PROCESSES SUB-SECTIONREDOX PROCESS TECHNOLOGYSummary

The new Redox Chemical Flowsheet HW No. 5, HW-38684, has been completed and is being issued at the end of the report period. The new Test Program Authorization, HW-38618, has been approved and issued. In rough draft form (and expected to be finished during the coming month) are (1) a review of the effects of the new flowsheet on critical mass, (2) waste storage production test, 202-S-2, and (3) descriptions and operating guides for the new Ozone and Silica Gel Tail-End facilities.

The processing rate at the end of the report period was solidly established at 11 tons of uranium per day. Maximum capacity is estimated at <11.5 tons per day.

Iodine release during periods when metal heels are being held in sodium nitrate is believed to be eliminated. Careful control of acid leakage into the dissolvers, plus the precautionary addition of sodium hydroxide with the sodium nitrate, apparently prevents the evolution of iodine-127 (introduced as iodate with the Chilean sodium nitrate) which is postulated to cause release of iodine-131 from the reactors.

A sample of solid material obtained from the plugged IB-IC Column overflow line during a forced shutdown has been studied and found to consist almost entirely of iron. The acid concentration in both the IBX and IBS streams was increased to forestall future difficulties.

To improve critical mass control after installation of the D-14 Concentrator, the operating liquid level in the Plutonium Concentrator (L-3) was successfully reduced by 40 per cent. The iron concentration in the product, on the other hand, remained high at 15 to 20 per cent.

The average exposure of the uranium charged to the dissolvers was 261 (253 to 264) MWD/T, its average cooling time was 107 (96 to 123) days, and the over-all plutonium and uranium recoveries were 99.0 and 99.1 per cent, respectively. Concentrated plutonium product ranged from 73 to 142 grams of plutonium per liter, with an average of 104 grams per liter.

Feed Preparation

Feed preparation was crippled again this month by unsatisfactory operation of the centrifuge feed jets. Two series of flushes of the feed tank (G-5) failed to provide significant improvement, nor did the installation of new jets help. It was subsequently found that most or all of the trouble was the result of a ruptured diaphragm in the vent valve, and the technology of feed preparation has thus been largely relieved of the responsibility for this serious difficulty. Since this situation was corrected, feed preparation steps have not been responsible for processing rate limitations.

Solvent Extraction

An increase in production rate to 11 tons of uranium per day was achieved. Maximum capacity is estimated at <11.5 tons per day. This increase was followed by a gradual but pronounced increase in plutonium loss to the 2AW stream of up to 0.2 to 0.3 per cent. It is possible that this is due only to the increased rate, since there are no basic flowsheet considerations which will explain this change. In accomplishing this rate increase, the IA and IS Columns were operated in parallel and are currently each running smoothly at 5.5 tons of uranium per day. Due to frequent backflushing of the centrifuge feed jets, the feeds to these columns were occasionally more dilute than normal, and this was reflected in erratic behavior in some of the subsequent columns. This, in turn, showed up in periodic higher waste losses and poorer decontamination.

A test of the IC Column capacity was made which indicated a flooding threshold of approximately 2450 gallons per hour per square foot, corresponding to a rate of 11.6 tons of uranium per day on the current flowsheet. It was necessary to reduce the flow to 2250 gallons per hour per square foot to break the flood, a rate which corresponds to approximately ten tons of uranium per day. It can be seen that the current production rate of 11 tons per day represents approximately 95 per cent of flooding in the IC Column.

When the IB-IC Column overflow line plugged, the IBU jumper was removed on two separate occasions during the period, and both the IB and IC Columns were flushed, the contents discharging through the open connectors. Solids were removed each time, and a portion of the solids was obtained for study in the laboratory, where it was shown that iron was the principal constituent, presumably as the oxide. Following the second shutdown, the IB Column overflow has been normal. On the theory that conditions of low acidity in the IB Column have caused entrainment of the iron from IBX in the IBU, the acid concentration was increased in both the IBX and IBS.

Decontamination

The average decontamination factors (logarithmic) across the three plutonium and three uranium cycles (including the permanganate head-end treatment) were 7.2 and 6.6, respectively. Uranium decontamination suffered sporadically from unsteady column operation, instrumentation difficulties, IB Column overflow plug, etc., and returned to "normal" only at report time. The final uranium product (E-12) averaged 1.9 in gamma ratio with one batch reaching a maximum of 11. Approximately five batches required treatment with silica gel.

Iodine-131 Emission Problem

At least one aspect of iodine-131 emission problem, viz., the release of iodine during periods when metal heels were being held in sodium nitrate solution, is believed to be solved with the discovery of abnormal amounts of acid in the dissolver during this period and abnormal amounts of iodine-127 in the Chilean sodium nitrate.

Members of Chemical Research Sub-Section have shown that this combination can produce a very rapid, nearly quantitative release of the iodine initially present as iodate in Redox sodium nitrate. It is postulated that the action of the nitric acid on the uranium metal heel reduces the iodate liberating iodine-127, which then displaces the previously adsorbed iodine-131 from the silver reactor. Careful control of acid leakage into the dissolvers, plus the precautionary addition of sodium hydroxide with the sodium nitrate to the metal heels, has apparently been completely effective in preventing this type of emission in the plant.

Plutonium Concentration

Due to the processing of low MWD/T metal, the amount of nitric acid in the concentrated plutonium has increased markedly to an average of 6.9 molar (ranging from 5.7 to 7.8). It is believed that this increase has contributed significantly to the corrosion being experienced, as noted by the average 160,000 parts of iron per million parts of plutonium shipped to 234-5 during the month. The Metallurgy Unit personnel expressed the opinion that the heat transfer surface, not the Raschig ring packing, is contributing the iron. Plans are being made to remove the present L-3 Concentrator tube bundle for inspection during the coming month.

A reduction of nearly 40 per cent in the operating liquid level of the plutonium concentrator (L-3) has been adopted with apparent success. This decrease in product inventory was desirable from the standpoint of critical mass considerations in the D-14 Concentrator (to be installed next month), to which the plutonium would be returned in the event of L-3 Concentrator failure. The operation of L-3 at the lower liquid level has failed, however, to produce any significant decrease in the iron content of the final plutonium product.

Waste Storage

An air-lift circulator (of a different design from that in the 104-SX tank) was installed in the 101-SX tank, and both its installation and its operation were accompanied by increased condensate flows. Pressurizations and increased condensate flow were also noted in several instances in both 101 and 104-SX tanks following periods ranging from less than four to more than eight hours, during which the air flow to the circulators had been interrupted either by design or by accident. No pressure or condensate flow increases have been observed during periods of continuous air flow.

PUREX PROCESS TECHNOLOGY

A cold run schedule and detailed run plans for the first two cold runs were prepared during the month. In addition, the document, HW-38675, "Considerations in Recovery of Acid in the Purex Plant", August 19, 1955, prepared by G. L. O'Neill, was issued.

Preliminary scope designs were issued for lengthening of the HA and IA Column scrub section shells and for installation of a coalescer-decanter system for

the IAP stream to minimize the effects of entrainment. A work order has been issued to Technical Shops to fabricate a prototype for a continuous alpha monitor for the 2AW stream.

Because of a lack of AA Fiberglas for repacking the failed B1 filter, specifications for use of 12 inches of 115-K Fiberglas (density of 7.1 lb/cu ft) were provided to replace the one inch layer of AA Fiberglas previously used. The filter packed in this manner should have an efficiency of 99.5 per cent for particles of 1 to 1.5 micron diameter.

BISMUTH PHOSPHATE PROCESS TECHNOLOGY

Iodine Control

The control of the release of radio-iodine to the atmosphere remained at the same level as experienced for the last two months (approximately 98+ per cent retained in the process) except for a three day period in which approximately 17 curies were released to the stack. It is believed the major portion of this release came from 3-5R dissolver prior to and during coating removal. This coating removal was the first one following the special tests in which the 3-5R and 3-5L silver reactors were placed in series (see below), during which poor performance was noted for the 3-5R reactor. The reactor has been regenerated.

Silver Reactors in Series

The 3-5L silver reactor, heater, and filter were placed in series with the 3-5R dissolver, heater, and silver reactor to evaluate the operating characteristics of a backup silver reactor. Thirteen individual tests were evaluated during the dissolver cycle. In all cases, the 3-5L backup reactor retained > 95 per cent of the radio-iodine passing through or released from the 3-5R reactor during standby, charging, and coating removal. It also removed >> 98 per cent of the radio-iodine passing through or released from the 3-5R reactor during the dissolution step. Furthermore, the operating data indicate that, for an increase in the inlet control temperature between 300 and 400 F, (a) the efficiency of removal during coating removal decreases, and (b) the efficiency of removal during dissolving increases. Details of these tests are reported in Document No. HW-38872.

Iodine Monitor

The purging of the cell which is counted for the radio-iodine in the off-gas remains to be solved. A new type sampler which draws an aliquot of the off-gas stream is being installed to eliminate this background buildup. In addition, temperature and voltage changes to the gamma ray probe have indicated erroneous off-gas compositions. It is believed that these difficulties have been corrected and the counter will again be placed in service as soon as the new sampler has been installed.

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URANIUM RECOVERY PROCESS TECHNOLOGYSummary

The high RCW losses encountered during the last part of July continued during the first week of August, averaging approximately three per cent. Flowsheet and minor equipment modifications were unsuccessful in reducing these losses. After hot caustic, water, and nitric acid flushes were given the first cycle columns on August 8, losses were significantly reduced to approximately 0.4 per cent. However, since sporadic high losses have continued and are believed caused by the overflow of RAU into the top of the RC Column through an interconnecting vent line (RAU aspiration leg to top of RC Column), a modified vent design has been recommended.

Plant decontamination performance was satisfactory throughout the month while processing blends containing 60 to 70 per cent of U Farm uranium which had been aged 17 months from pile discharge. Instantaneous processing rates ranged from four to seven tons of uranium per day and were limited primarily by the boil-off capacity of the intercycle concentrators. RCX rates could not be reduced sufficiently to alleviate the intercycle capacity bind since such reductions aggravated RCW losses.

Scavenging studies on 10,000 gallon test batches in the 221-U Building demonstrated that low residual cesium and strontium concentrations (approximately 0.1 and 0.2 microcuries/ml, respectively) are obtained in scavenged supernatant when an inert strontium scavenger is used to supplement nickel ferrocyanide scavenging. On the basis of the test batch data and satisfactory soil column results on the test batch supernatants, a 750,000 gallon tank test was initiated.

Metal Removal

A summary of the source, age, and irradiation history of the metal removed from the three operating tank farms is given below:

<u>Tank</u> <u>Sluiced</u>	<u>Fraction of</u> <u>Uranium Removed</u>	<u>Minimum Age from Pile</u> <u>Discharge, Months</u>	<u>Ave. Exposure Level</u> <u>of Uranium, MWD/T</u>
109-BY	0.062	40	500
105-115-TX	0.533	29	506
101-U	0.405	17	444

Metal removal operations were essentially completed at the BXR removal facility this month. Only small heels remain in Tanks 105-BX and 109-BY.

Solvent Extraction

Solvent extraction operations were carried out under modified HW No. 6 TBP Flowsheet conditions.

RA Column operating conditions were rather steady all month and resulted in RAW $K^{1/2}NO_3$ values ranging from 5 to 6 M and operation at 55 to 60 per cent of the extraction section "pinching L/V". In spite of the consistent operating conditions, the RAW losses varied considerably at times, generally less than 0.1 per cent, but occasionally high and erratic ranging from 0.2 to two per cent. The occurrence of the periods of low losses coincided with the use of a final organic phase wash (RIOOS) containing one per cent nitric acid. The high, erratic losses were generally sustained while this wash contained three per cent sodium carbonate.

First cycle stripping column losses continued high during the last week of July and the first week of August, averaging approximately three per cent. No significant reduction in the RCW losses resulted when:

- (a) Sanitary water was used for RCX makeup in place of demineralized water.
- (b) Air trapped in the RCU jet-out standpipe was vented.
- (c) The RAU acidity was halved by doubling the water-scrub (RAS) flow.

Since laboratory studies with plant solutions revealed no abnormal solvent-extraction characteristics for these solutions, it was postulated that RAU might be bypassing the RC Column through the RAU standpipe vent (aspiration leg). Therefore, with the columns operating, the position of the organic level in the RAU standpipe was determined by actually feeling the temperature gradient on the RAU standpipe. These crude measurements indicated the organic level was approximately six inches below the point where RAU could be easily surged into the top of the RC Column. Although organic was not bypassing the RC Column during the short period when the measurements were taken, it is considered likely that with the flow variations and pulse conditions encountered during normal operation, bypassing does occur. This postulate is supported by the fact that there is at least a partial correlation of waste losses with rates, increased rates resulting in increased losses. Consequently, a modified RAU standpipe is being fabricated which should eliminate RC Column bypassing.

Since all other efforts to reduce the RC Column waste losses were unsuccessful, the first extraction cycle was shut down and flushed with hot nitric acid, water, and hot ten per cent caustic solution on August 8. (RA Column flushed with 20 per cent HNO_3 only). When operation was resumed, losses initially averaged 0.4 per cent. After a week of operation, they gradually increased to five per cent, then returned to the previous 0.4 per cent average. The average RCW loss for the three week period of operation since the flush was approximately one per cent.

Second cycle uranium losses were consistently low and averaged 0.3 and 0.1 per cent from the RD and RE Columns, respectively.

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Gamma decontamination performance was rather consistent, generally giving over-all (RAF/REU) logarithmic decontamination factors of about 4.9. The RCU activity ranged from 20 to 500 times that of aged natural uranium. Since the RDF activity did not exceed 50 times that of aged natural uranium, it appears that much of the RCU activity was entrained and separated out somewhere in the RCU-RDF system.

The average REU fission production gamma activity was essentially that of aged natural uranium. The activity of single product batches varied rather erratically from half to twice this value, however, probably because of difficulties in obtaining representative REU samples and in counting this low activity.

Specific fission product analyses have been obtained on corresponding RAF, RCU, and REU samples. Average results for seven such sets of samples are tabulated below. Decontamination factors varied appreciably in the various sets of samples. However, the average values reported are believed representative.

Stream	Gross Gamma		% of Gross Gamma				dF			
	Per Cent ANU	dF	Nb-Zr	Ru	Cs	Ce	Nb-Zr	Ru	Cs	Ce
RAF	8×10^6	--	5	13	68	13	--	--	--	--
RCU	3.5×10^3	3.4	12	64	11	13	3.2	2.8	4.5	3.7
REU(1)	100	1.6	13	63	>6	>10	1.5	1.7	--	>2.2

(1) Because of phase separation in the RCU system, actual effective solvent extraction dF's are less than those reported here.

Waste Handling

Approximately 6,000 gallons of concentrated scavenged waste (both nickel ferrocyanide and calcium scavenged) per ton of uranium at an average pH of 9.5 were returned to storage for settling in Tanks 107 and 108-BY. The average compositions of the supernatants were:

Tank No.	Sr^{90} , micro-curries/ml	Cs^{137} , micro-curries/ml	$\text{PO}_4^{=}$, M
13-107-BY	0.3	0.3	0.13
14-108-BY	To be sampled 9/4/55		

The soil column test of the scavenged supernatant from Tank 13-107-BY indicated satisfactory soil retention of strontium (greater than two column volumes) and only slight breakthrough of cesium at 1.5 column volumes. It is planned to transfer the supernatant to the BY No. 4 crib.

Four 10,000 gallon batch tests using inert strontium scavenger to supplement nickel ferrocyanide scavenging were completed in the 221-U Building. On the basis of the encouraging test results reported below, a 750,000 gallon tank test was initiated, employing essentially the same conditions employed in Tests 1 and 3. Waste concentration is to be discontinued during the 750,000 gallon test.

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Test	Concentrations, M				pH During Scavenging	Concentration after Scavenging, micro-curies per ml	
	$\text{Sr}(\text{NO}_3)_2$	$\text{Na}_4\text{Fe}(\text{CN})_6$	NiSO_4	$\text{PO}_4^{=}$		Sr^{90}	Cs^{137}
1	0.004	0.0025	0.0033	0.12	10.5	0.18	0.09
2	0.004	0.0025	0.0025	0.13	12.2*	1.17	10.5
3	0.004	0.0025	0.0025	0.13	9.4	0.27	0.03
4	0.006	0.0025	0.0025	0.13	11.9	- -No Sample- -	

* After scavenging was completed, the pH was adjusted to 10.4 with HNO_3 .

The results of Tests 1 and 3 demonstrate the satisfactory removal of cesium and nearly satisfactory removal of strontium when proper pH control is obtained (pH range 9.0 to 10.5).

The unsatisfactory scavenging results obtained in Test 2 were expected since the pH was high during the actual scavenging, and previous laboratory studies have shown that later reduction of the solution pH into the optimum range does not significantly improve the residual cesium and strontium concentrations.

Soil column studies of Test 1 supernatant indicated satisfactory soil retention of cesium and strontium (greater than two column volumes without breakthrough of either Cs or Sr).

Construction of the C Farm "In-Farm Scavenging" facilities should be complete about September 15, 1955, except for the calcium nitrate addition facilities, and actual scavenging will start shortly thereafter. Laboratory studies have been performed on samples of 13 tanks of stored TBP wastes. Satisfactory scavenging conditions have been obtained for each of the tanks. A report containing the recommended scavenging conditions is being prepared.

In-Line Monitors

On August 1, 1955, after satisfactorily monitoring almost three million gallons of dilute waste since May 12, 1955, the pH electrode sampler cell assembly of the 11-6 pH monitor became plugged with crystals as a result of a failure of the automatic flushing system. The cell was replaced. Aside from this failure, only a few minor instrument and operational difficulties interrupted the satisfactory operation of the neutralized waste pH monitor and the pH controlled waste neutralization system.

The uranium photometer instrument, monitoring the uranium concentration of the second cycle feed solution has been out of service for the month due to installation difficulties of an improved sampler and sensing element.

The scintillation instruments monitoring the gamma content of the first and second cycle product solutions have been out of service for the better part of the month. The first cycle instrument is out of service, and will probably remain so, as the RCU activity is greater than the design limitations of the presently installed

instrument. The second cycle monitor, although out of service for almost four weeks while the 19-3 (REU) transfer pump was being replaced, is currently in service and operating satisfactorily.

URANIUM CONVERSION PROCESS TECHNOLOGY

Product Quality

In general, the quality of the UO_3 produced during the month was well within specification limits. The UO_3 contained metallic impurities totalling about 100 parts per million parts of uranium, and the fission product gamma activity of the UO_3 averaged 78 per cent of aged natural uranium gamma activity. Powder reactivity averaged 1.13, using nominal 0.05 weight per cent sulfamic acid as an additive.

Semi-Continuous Calcination Pot Tests

To obtain data pertinent to the continuous calciner program and to check the operating feasibility of semi-continuous denitration in a UO_3 Plant electric pot, two tests, whereby 100 per cent UNH solution was metered almost continuously (shut down for intermittent powder unloading) into a hot bed of UO_3 , were completed. The initial charge to the pot consisted of 321 Building continuous calciner UO_3 . In the first, 20 hour test, the charge temperature was held low (240 to 300 C). Granular (similar to continuous calciner) UO_3 was produced at a maximum instantaneous rate of approximately 1.5 to 2.0 tons of uranium per day. This run was terminated because of lump formation during the last five hours of the run, probably caused by operation for short periods at too low a batch temperature. In the second, 14.5 hour test, the batch temperature (TC-2) was held high (up to 450 C). This run was terminated when the UO_3 deentrainment chamber and fume vent line plugged with UO_3 . At the termination of the run, the pot charge appeared to be converting to normal pot powder. In the first run, when low bulk temperatures and granular powder were maintained, little powder entrainment was encountered. Analytical data on the powder produced is not yet available.

Since calcination rates comparable to the normal batch calcination rate were attained in the first semi-continuous run, additional continuous runs are planned to determine the capacity potential of semi-continuous pot operation.

Stripping Study

Routine sampling of the 60 per cent UNH holdup tank (C-1) for TBP and DBP has continued in order to determine stripping efficiency and the possible relation of TBP and DBP in the process to calcining pot "blowbacks". To date, average concentrations of only 0.007 g/l (1.5 ppm uranium) and 0.02 (18 ppm uranium) for TBP and DBP, respectively, have been reported by the laboratory, thus indicating efficient stripping operation. There appears to be no relationship between "blowbacks" and DBP and TBP concentrations in the pot feed. "Blowbacks" have been less frequent and less severe during this report period.

DECLASSIFIEDZ PLANT (ISOLATION, PURIFICATION, AND FABRICATION) PROCESS TECHNOLOGYIsolation Building

The first two lots of plutonium nitrate solution produced under Production Test 231-16 (HW-36334, "Single Peroxide Process") have been processed without difficulty by the customer, to give metal of satisfactory purity. Operation under this production test is continuing.

Oxalate Precipitation (Task I)

Redox product solution containing as much as 25 per cent iron (based on the plutonium weight) was processed routinely through Task I. The purity of the metal obtained from this material was normal, the buttons and fabricated pieces containing 100-200 parts iron per million parts plutonium. The loss to recycle from Task I averaged six per cent for this period, compared with an average of four per cent obtained recently with feed containing only 50,000 parts iron per million parts plutonium. The increase could not be definitely correlated with the higher iron content.

Equipment alterations completed during the month included installation of auxiliary hoods for the chemical addition system, to provide control of contamination, and removal of the shielding from the Hood 5 supernatant head tank, to increase the critical mass limit (from 630 to 740 grams).

Hydrofluorination (Task II)

The refluorination rate averaged 18 per cent in August, as compared with 30 per cent in July and 20 per cent in June.

Reduction (Task III)

The average reduction yield for the month was 96.6 per cent, as compared with 98.1 per cent in July. Reduction-casting of Model 110 charges is now giving buttons which separate from the crucibles relatively easily, even without the addition of an iodine booster. Except for a ring of tightly stuck crucible around the equator, the crucible falls off the button with a single hammer blow.

Briquetting

On a test basis, dry hood air has been substituted for the inert gas formerly used in the briquetting operation. No noticeable change in either operating hazards or product quality has resulted.

Crucible Shop

Crucible shop activities during the month have included the following services:

- (a) For the Product Metallurgy Unit, routine fabrication of graphite molds coated with MgO - two per cent Na_2SiO_3 .
- (b) For the Fuel Assembly Unit, the preparation of slip-cast crucibles of Al_2O_3 , MgO, and zircon. These crucibles are to be evaluated for possible use in holding AlSi melts in the Sevac canning process.
- (c) For the Pile Graphite Studies Unit, the preparation of alumina heating plates with embedded, platinum heating elements.

Product Quality

The pile exposure for material processed for the low exposure program was set on the basis of n/g-s data available from materials at both higher and lower exposures. It now appears that the relationship of pile exposure and plutonium-240 content is such that the relative plutonium-240 content is at a maximum at these exposure levels, and plutonium quality relative to neutron emission at these exposure levels is marginal. Accordingly, recommendations have been made to reduce the pile exposure of this material by ten MWD/T.

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DECLASSIFIEDRECUPLEX DEVELOPMENTGeneral

Recuplex operations during the month were planned to (1) find answers to the process problems, especially in feed preparation and product evaporation, which have arisen since startup, (2) gain operating experience, and (3) as a semi-production facility, recover the plutonium from Z Plant recycle solutions which could not be conveniently handled in any other way. During the month (July 25 to August 26), about 22,000 liters of feed solution containing 9.3 kilograms of plutonium were processed through the solvent extraction system. Feed sources included Task I supernatants and clean-out solutions, slag and crucible solution, skull solution, solutions of off-standard fluoride powders and hood sweepings, and Recuplex recycle. Feed stream (CAF) plutonium concentrations ranged from 0.01 to 10 grams per liter, product (CCP) concentrations from 20 to 35 grams per liter and waste stream (CAW) concentrations from 10^{-5} to 5×10^{-3} grams per liter (averaging ca. 0.4 per cent of the feed plutonium).

Slag and Crucible Operations

The recovery of plutonium from slag and crucible residues has averaged 104 per cent for materials from new Task III (ten runs, ranging from 57 to 143 per cent) and 138 per cent for material from the old Task III (13 runs, ranging from 96 to 438 per cent). Clean-outs of the dissolvers have shown that complete dissolution is generally obtained with both types of residues. Complete iodine removal, a problem in the early dissolution runs, is now achieved through the addition of oxalic acid with the charge to the dissolvers. The oxalic acid is believed to prevent the formation of iodate in the dissolution process.

Solvent Extraction

The solvent extraction system has been working very well, considering the wide variety of feeds used. It has operated under total reflux for hours at a time, while building up the product concentration, and it is turning out a product with a high purity (e.g., 200 ppm Al, 1000 ppm Fe, 400 ppm Mg, 1000 ppm Si, and similarly low levels for the other impurities).

Product Evaporation

Gross corrosion is occurring in the product evaporation system, with the result that the evaporated product contains ten to fifteen per cent iron (plutonium basis). A preliminary survey indicates a probable penetration rate of 0.004 to 0.008 inches per month on the Raschig rings (supposed to be 304 stainless steel, but suspected to be 303 stainless) with which the steam stripper is packed. Extensive foaming of product solution, with consequent transfer into the condensate receiver, has been experienced during product evaporation. Use of an anti-foam agent has not been entirely successful.

DECLASSIFIEDSolvent Degradation

The accumulation of TBP-degradation products in the solvent, both from alpha particle action and from recycling of DBP along with plutonium from the solvent treatment procedure, has made frequent solvent washing necessary. Thus far, 186 grams of difficultly stripped plutonium have been washed from the solvent, about six times the amount predicted from laboratory studies of solvent degradation. Chloride content in the product solution has been low, 0.014 to 0.018 g/l

Hydrogen Peroxide "Explosion"

On August 24, at 3:50 P.M., approximately 13 liters of 32 per cent hydrogen peroxide solution decomposed violently in a glass vessel in the Cold Chemical Addition Hood, shattering the vessel and two adjacent glass tanks and breaking two lucite hood panels. The incident is attributed to the fact that the hydrogen peroxide vessel, a vessel used for ferrous ammonium sulfate, nitric acid, and sodium nitrite, and a vessel used for aluminum nitrate, all drain into a common process header and all are connected to the same vent and overflow drain headers. The hydrogen peroxide solution was probably contaminated with an impurity from one of these sources which acted as a catalyst for its decomposition. With the reaction occurring, the solution is believed to have warmed to a temperature at which the reaction became violent.

It is believed that the feed makeup steps can be revised to eliminate the use of hydrogen peroxide in Recuplex in the future. If necessary to continue the use of hydrogen peroxide, the hydrogen peroxide addition vessel will be isolated from the other cold chemical addition tanks.

Equipment Experience

Significant items relative to equipment experience for the period are:

- (a) The agitator in the G-9 feed makeup vessel failed and was replaced.
- (b) The J-9 condensate receiver was replaced with a critically safe vessel due to the recurring entrainment problem.
- (c) The pulse generator bellows have operated through cycles totaling 4.8×10^6 for H-1 and H-2, and 6.9×10^6 for H-3.
- (d) Three Model E Chempump spares have been re-canned with heavier shells; one Chempump froze up, due to dry operation.
- (e) All accessible moving parts on the agitators and pumps have been shielded.
- (f) The D-1 vessel (dissolver) thermowell corroded out.

Process Chemistry

Measurements of valence distribution in Recuplex product CCF showed 70 per cent plutonium(III) and 30 per cent plutonium(IV) shortly after startup in July. Currently, the distribution is 30 per cent plutonium(III), 65 per cent plutonium(IV), and 15 per cent plutonium(VI), although no measurements have revealed any oxidation-reduction reagents in the CCX, or shown any other reason for the difference. Increasing the CCF acidity from 0.4 M to 2 M HNO_3 results in 100 per cent plutonium(IV) after 80 minutes.

Laboratory stripping of Recuplex CCF also resulted in some plutonium(III); the first contacting showed 30 per cent plutonium(III) and 65 per cent plutonium(IV), and the second, 65 per cent plutonium(III) and 32 per cent plutonium(IV).

Further analyses have been made of the Recuplex slag and crucible dissolver off-gas, to determine whether an explosion hazard exists due to hydrogen. A maximum of two per cent by volume was measured after the addition of reagents but before heating. Since the explosion limit in air is four per cent, and the dissolver off-gas is 20 per cent carbon dioxide, a reasonable safety margin is present.

A number of samples of Recuplex silica cake slurry are being analyzed for plutonium content, to establish a "book" value and eliminate the need for the tedious analysis on every cake slurry. To date, the slurries average 0.02 g/l plutonium, or about one gram per slurry.

Recuplex hydrogen peroxide (32 per cent) has been tested for abnormal reactivity and was shown to have no more tendency for catalytic decomposition than laboratory reagent grade peroxide. As little as 0.3 g/l Fe^{++} caused violent decomposition in 13 minutes, and 0.03 g/l Fe^{++} initiated a slow temperature rise (two degrees over one and one-half hours). Nitrite resulted in no visible change, although, with iron present, the catalytic decomposition speeded up. Polythene gasket material had no short term effect; however, upon standing over night in contact with the peroxide, a catalytic effect was noted. These experiments point out the possibility of a slow temperature rise due to catalytic agents at low concentration and the eventual violent decomposition. These effects would be enhanced on a gallon scale.

234-5 DEVELOPMENT

Continuous Task I

A laboratory scale, continuous oxalate precipitation run was performed to test filtration behavior and solubility losses resulting from this type of operation. Results were highly satisfactory, and plans are being made for continuous operation in the prototype reactor. The following features appear necessary:

- (1) Pre-reduction of the feed to plutonium(IV) with hydrogen peroxide.
- (2) Batch precipitation at 55 C, followed by cooling to 25 C before starting continuous operation.

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- (3) Top addition of feed and 1 M $\text{H}_2\text{C}_2\text{O}_4$ and bottom withdrawal of slurry.

Prior reduction of the feed is important since the reduction rate at 25 C is not rapid enough to insure formation of 100 per cent plutonium(IV) during continuous operation. The favorable behavior of the preformed precipitate is retained through the continuous precipitation.

The drum filter and screw-drier-calciner for processing Task I oxalate have been completed, and cold runs have started, using a filter aid-clay slurry as stand-in for the precipitate. These tests demonstrated satisfactory performance of the filter and drier-calciner equipment. On the other hand, modifications to the feed system are desirable.

Task I Assistance

Based on visual, qualitative observation in a Task II furnace, sintered silicon carbide was proposed by Manufacturing personnel as a replacement filter material for Task I filter boats. A sample was exposed in ten per cent oxygen in hydrogen fluoride at 600 C for two and one-fourth hours. Since a weight loss of 20 per cent was incurred, further tests were dropped.

Task III Assistance

Evaluation of NELCO calcium to be used without redistillation or grinding is nearing completion. This calcium has 1000 ppm magnesium as compared to 100 ppm for redistilled calcium and is of mesh size -4, +80, as compared with the material now used, -8, +80. Sixty gram scale reductions showed that satisfactory plutonium button purity could be attained. Plant scale reduction castings with no booster resulted in yields of 95.4 and 98.0 per cent.

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CHEMICAL DEVELOPMENT SUB-SECTIONHOT SEMIWORKS PUREX STUDIES

During the month Hot Semiworks Run PX-6 was made to test the performance of the longer scrub section (13 ft. 8 in.) and the more efficient scrub-section cartridge (0.80-in. holes, 23% free area, and 1-in. plate spacing) in the IA Column at equivalent plant processing rates of 10 and 14 tons of uranium per day using HW #3 Purex flowsheet. The data indicate a slight improvement (up to a factor of two) in the IA Column decontamination over previous HW #3 flowsheet studies, but the IA Column decontamination still falls short of meeting flowsheet by approximately a factor of from 4 to 20, employing fresh vs. recycled solvent, respectively. Decontamination in the HA Column was also down from flowsheet by a factor of from approximately 7 with fresh solvent, to as much as 35 with recycled solvent. There were no significant differences attributed to processing at 10 vs. 14 ton/day equivalent Purex Plant throughput rates. As indicated above, some improvement (approximately a factor of 3) in both HA and IA decontamination was noted when fresh Soltrol-TBP solvent was used in place of recycled solvent. As has been previously noted, extended operation (up to 24 hours) at one set of operating conditions resulted in a constantly decreasing decontamination factor until a minimum D.F. (as low as 15 for the HAP) was reached at the end of the run.

In general, all uranium and plutonium waste losses were approximately 0.2 per cent, or less, with the exception of Pu losses in the IBU and 2AW streams, which averaged 0.6 and 0.54 per cent, respectively. The longer (12-ft.) standard cartridge in the IBS Column reduced the concentration of uranium in the IBP by 5 to 10 fold over previous Hot Semiworks runs (e.g., the IBP contained 1×10^{-4} per cent of the HAF feed uranium).

Although the inner teflon bellows in the IO Column pulse generator failed prior to the completion of PX-6, operation was continued until the feed was exhausted. Two additional (HA and HC) inner bellows failed during the decontamination period. The shielded 3-in. HA bellows operated for 1842 hours for a total of 6.6×10^6 cycles before failure.

Analysis of the poor Hot Semiworks decontamination performance in the six hot Purex runs made to date, supported by Chemical Research and Process Chemistry laboratory studies, and by cold semiworks scrub section studies, has led to the conclusion that poor scrub-section performance caused primarily by back-mixing of fission products in the aqueous phase from the HAFS (and IAFS) feed point up into the scrub section is a contributing cause of the failure to meet flowsheet decontamination factors in the Hot Semiworks HA and IA Columns. The adverse effect of this aqueous-phase back-mixing from the mid-column feed point has been to render

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approximately the bottom six feet of the scrub sections ineffective for scrubbing. This adverse effect can be overcome in two ways, viz.: (a) by increasing the scrub section heights to approximately 18 ft., and (b) by the installation of newly-developed "anti-backmixing" caps (see Chemical Engineering Development studies, below) between the mid-column feed point and the bottom of the scrub section. The latter approach is being adopted in the Hot Semiworks prior to the next run. Anti-backmixing caps, developed and tested in the cold semiworks, are being installed in the Hot Semiworks HA and IA Columns. The scrub-section cartridges will otherwise remain essentially unchanged from Run PX-6.

The weighted evidence indicates, however, that in addition to the above-mentioned backmixing an adverse and as yet unidentified chemical factor has also contributed significantly to the poor decontamination observed to date. This chemical factor, which may relate to feed preparation conditions or solvent behavior, has the effect of increasing the distribution ratio of zirconium-niobium into the solvent phase at the mid-column feed point, and hence reducing the decontamination factor realized at the "feed stage" in the columns. Correction of the backmixing is expected to facilitate identification and the eventual correction of the adverse chemical factor.

Following Run PX-6, B-Cell was decontaminated and entered during the month for the installation of anti-backmixing caps in the HA and IA Columns, and for replacement of teflon bellows in the pulse generators on the IO, HC, and HA Columns (see below).

Since the decontamination performance of the 13-ft. high Purex Plant HA and IA Column scrub sections will also be impaired by aqueous-phase backmixing from the mid-column feed point, the recommendation was made during the month that the scrub section heights in these two Plant columns be increased by approximately 7 feet prior to the "hot" startup of the Purex Plant, and that anti-backmixing plates be installed in the HA, IA, and 2D Columns. Engineering studies are in progress by the Design and Project Sections to determine the most expeditious method of lengthening the Plant HA and IA Columns, and to establish the delay, if any, that these changes will cause in the Purex Plant hot start-up date.

Separations Equipment Development

Teflon Bellows Pulse Generators. Teflon bellows with machined near-sine-wave, deep convolutions have been procured from the John Dore Company (Dore E-8-A bellows), to replace the sharp V-type bellows which have exhibited a high failure frequency in the Hot Semiworks pulse generators. These new-type bellows are being installed in the pulse generators on the Hot Semiworks IO, HC and HA Columns. The HC and HA pulse generators are

simultaneously being converted from three-inch to four-inch diameter bellows units to permit shorter bellows strokes for a given amplitude in the columns, but the bellows stroke for the IO Column, which previously employed four-inch bellows, will remain essentially the same. Installation of these new-type bellows requires modifications of the pulse legs which connect the pulse generators to the bottoms of the columns. At month end, the required modifications were firmed-up, fabrication of the necessary parts was completed, and installation in the Hot Semiworks was in progress.

Hot Semiworks In-Line Instruments. The continuous, in-line gamma and alpha monitors continued to operate satisfactorily during Run PX-6, with in-line results most of the time being within ten per cent of values based on laboratory analyses of process samples. The uranium photometers used on organic streams gave erratic results which were caused by faulty light source controls. The uranium photometers used on aqueous streams operated satisfactorily, giving results within two per cent of laboratory values. The pH monitor continued its maintenance-free operation. Routine standardization is all this device has required since the unit was placed in service concurrent with the start up of the Hot Semiworks on Purex studies. The waste stream uranium polarographs were inoperable during Run PX-6.

PUREX DEVELOPMENT

Process Chemistry

Hot Semiworks Assistance. Hot Semiworks Purex Run No. PX-6 was completed in the Hot Semiworks during the past month. While uranium and plutonium recovery were good, decontamination was poor over the first and second cycles. Decontamination during periods where fresh solvent was used was generally better in both cycles than when recycled solvent was used. Radioactivity not removed from product streams was primarily Zr-Nb. Studies made in an attempt to determine the cause of poor decontamination may be summarized as follows:

Solvent Quality. On the basis of dilute uranium and tracer Zr-Nb distribution ratios, rate of uranium transfer, dispersion and disengaging times, laboratory pulse column runs, and batch contact studies, the recycled solvent was not inferior to unused solvent. Batch contact and miniature pulse column studies involving unused 30% TBP-Shell E-2342 as solvent and 1% tracer-level Hot Semiworks HAF indicated better gross gamma decontamination (by factors of three to four) than with either unused or recycled Hot Semiworks solvent (which employed Soltrol-170 as diluent). However, similar studies with used 30% TBP-Shell E-2342 (from Uranium Recovery Plant) gave results almost identical to those obtained with Hot Semiworks solvent.

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Analyses for butanol were obtained on various samples of TBP and on the Soltrol used in Hot Semiworks solvent. All TBP samples were within specifications (less than 0.05 N). The Soltrol samples were reported as less than 0.00 N by the butanol test but to contain an unidentified component which reduces dichromate.

Solvent Treatment. Radioactivity present in Hot Semiworks solvent, both before and after the IO contact, was 30 and 20 per cent Zr-Nb and Ru, respectively. Laboratory contacts simulating the IO Column duplicated plant performance (gross gamma D.F. = 7). Gross gamma D.F.'s of 27 with one per cent, and 40 with 5 and 10 per cent NaOH were obtained in similar contacts substituting NaOH for Na_2CO_3 as used in the Hot Semiworks. Use of technical grade vice C.P. Na_2CO_3 had no effect on gamma decontamination of the solvent. Dilute uranium distribution ratios were unaffected by any of these solvent washing procedures and were, in all cases, equivalent to that of unused solvent (E_a^0 of 0.01 or less).

Feed Quality. Relatively high decontamination factors (10 to 100 times those obtained in the Hot Semiworks IA Column) have been obtained consistently with Hot Semiworks IAF and solvent (both used and unused) in laboratory batch, batch countercurrent, and miniature pulse column studies. These high D.F.'s have been confirmed by Chemical Research in Mini miniature mixer settler runs. Similar studies involving Hot Semiworks HAF at one per cent tracer level also showed generally better decontamination than obtained in the Hot Semiworks HA Column. Batch contacts involving two extractions, three scrubs, and five strips were made using Hot Semiworks IAF (1) as received, (2) after air sparging for one hour, and (3) immediately after addition of NaNO_2 to 0.01 M. No significant differences in extraction behavior of fission products were observed as a result of these treatments. These laboratory tests are taken to indicate that no abnormal forms of Zr or Nb contributing to poor decontamination exist in the Hot Semiworks feed solutions, at least in samples as received in the laboratory.

Scrubbing of Hot Semiworks Organic Product Streams. Exhaustive scrubbing (seven batch contacts at flowsheet volume ratios) of Hot Semiworks HAP and IAP streams gave decontamination factors ranging from 30 to 400 depending on the initial degree of decontamination. In all instances the organic streams, after two batch scrubs, met or exceeded expected flowsheet decontamination. The HAP and IAP samples used had been taken 10 to 80 hours before the laboratory studies were made. However, similar studies made on miniature pulse column HAP showed no change in the Zr-Nb scrub distribution ratios for standing times from a few minutes to 66 hours.

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Rate of Zirconium Transfer. Batch contacts of Hot Semiworks IAP with 3 M HNO_3 (HAS) indicate that 95 per cent of the equilibrium organic phase zirconium concentration is attained within one minute with vigorous agitation. These studies are being continued with an agitator designed to simulate pulse column mixing.

Specific Fission Product Decontamination Factors. Hot Semiworks HA Column decontamination factors for gross gamma, Zr-Nb, Ru, rare earths, and Cs were about 10, 10, 100, 2000 and 10^4 , respectively. The high D.F.'s observed for non-extracted fission products such as cesium and rare earths compared to the low D.F. for Zr-Nb indicate that no significant persistent entrainment of feed aqueous phase or radioactive solids occurred in the HAP. Similar D.F.'s were observed for the IA Column. Since the sampling equipment used for these streams may behave as efficient de-entrainers, these observations do not rule out the possibility of coarse entrainment in HAP or IAP. They also do not rule out the possibility of entrained aqueous or solids arising from the scrub section only.

321 Building Assistance. Process Chemistry has continued to supply radioactive zirconium tracer to the 321 Building for use in evaluating different scrub section designs. Most of the tracer supplied has been obtained by dissolution of irradiated Zircalloy coupons as previously described. This zirconium appears to have solvent-favoring forms giving rise to higher scrub E_a^0 's (0.2 to 0.4) than observed for dissolver solution zirconium (ca. 0.1). Contact of the tracer solution with solvent prior to use in the pulse columns appears to remove some of these organic-favoring forms, resulting in a tracer with a scrub E_a^0 nearer 0.1. As an alternative method of preparing this radioactive tracer, zirconium was successfully extracted in the laboratory from Redox IAW by TTA-benzene solvent and stripped into 10 M HNO_3 . Extraction and scrub distribution ratios for this zirconium under Purex HW #3 Flowsheet conditions are being determined.

Chemical Engineering Development

Pulse Column Studies. During the month, 53 runs were made in the Demonstration Unit to characterize the solvent extraction and backmixing behavior of Purex A-type column scrub sections in an effort to develop a more efficient cartridge. In addition, three runs were made in Plant scale prototype HA Column to determine the extent of backmixing. Highlights of the runs are:

Zirconium Tracer Studies. The extraction efficiency of a variety of scrub section cartridges was tested with zirconium obtained from dissolved irradiated Zircalloy coupons as a fission product tracer. Low values of D.F. were obtained using the tracer technique, and the tracer has been

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found to contain a species of zirconium with an abnormally high organic-to-aqueous distribution ratio (ca. 0.1 to 0.4 as compared with 0.01 to 0.06 stated in the Purex Technical Manual). Consequently, relatively large variations in D.F. may result from minor variations in the average Zr distribution ratio. The results indicated, however, that:

1. The performance, as indicated below, of sieve plate cartridges having 0.03 and 0.125 in. diameter holes was about the same as that of nozzle plates operated with the organic phase continuous. The use of a nozzle plate cartridge with aqueous phase continuous resulted in improved performance.

<u>Cartridge</u>	<u>Interface Position</u>	<u>Over-All Zr D.F.</u>
0.08-in.-diam. hole sieve plate	Top	11
0.125-in.-diam. hole sieve plate	Top	6 to 15
6% free area nozzle plate	Top	25
6% free area nozzle plate	Bottom	7 to 10
10% free area nozzle plate	Bottom	10

2. Doubling the scrub flow (and increasing the extractant flow to avoid high U losses) tended to increase the Zr D.F.
3. Increasing the spiked Zr activity in the feed by 3-fold had no effect on Zr D.F.
4. Increasing the scrub section height from 8.5 to 11.8 ft. for a 6% free area nozzle plate cartridge, bottom interface, double scrub flow condition increased the Zr D.F. by a factor of 2.
5. Tests in a 4-in.-diameter by 8.5-ft.-high scrub section with and without three 18% free area louver plates gave a possible two-fold increase in Zr D.F. without the louver plates. Visual observation indicated that on this small scale the louver plates were relatively ineffective as dispersing agents, and their net effect was probably to shorten the effective cartridge height.
6. Insertion of an anti-backmixing cap to provide an organic seal below the scrub section, thereby preventing backmixing upflow of the feed-point aqueous phase, increased the Zr D.F. by a factor of 2.
7. Use of a 42-in.-high section of "sieve cylinder" cartridge gave a Zr D.F. comparable to that obtained in a 100-in.-high standard cartridge.

Backmixing Studies. Efforts directed towards defining and minimizing the effect of backmixing on scrub section decontamination performance continued. Highlights of the findings are as follows:

1. The extent of backmixing as measured by eddy diffusivity⁽¹⁾ in a "sieve cylinder" cartridge was about double that in a standard sieve plate cartridge.
2. The extent of backmixing in a pulsed scrub column packed with 1/2-in. stainless steel Raschig rings was approximately double that obtained in a standard cartridge.
3. Backmixing studies employing 24-in. and 32-in. diameter pulse columns showed essentially no scale-up effect (compared with 4-in. column studies), provided the heights occupied by the louver-plate sections are subtracted from the effective height of the cartridge.

The use of an anti-backmixing cap, a "bubble cap" equipped with an aqueous phase trap, to provide an organic seal below the scrub section is being tested. Preliminary results with this device indicate that it effectively prevents backmixing of the HAFS from the column feed point up into the scrub section, and anti-backmixing caps have been constructed for installation in the Hot Semiworks HA and IA Columns prior to the next Hot Semiworks run.

Separations Equipment Development

Purex Plant Pulse Generators. Testing of the small (Size 1) Purex Plant pulse generator was terminated after 682 hours of operation. The leakage rates past the piston were determined at the end of the test for comparison to those obtained when the unit was new. No significant change in leakage rate was noted. The leakage rate data are tabulated below for comparison:

$$(1) \quad \ln \frac{c_0}{c} = \frac{hl}{E}$$

- c = concentration of the back-mixed component at height h (inches) above the bottom of the scrub section.
- c₀ = concentration at bottom of scrub section.
- h = height, in.
- l = continuous phase flow rate, in./min., based on the superficial column cross-section.
- E = eddy diffusivity, in.²/min.

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Pulse Frequency Cycles/Min.	3/64-In. Diam. Weep Hole In Piston Leakage Rate, Gal./Min.		Solution
	At 1 Hr.	After 682 Hr.	
0	0.206	0.209	Organic
24	0.207	0.214	Organic
52	0.204	0.210	Organic
71	0.187	0.198	Organic
98	0.156	0.140	Organic
0	0.247	0.238	Water
29	-	0.246	Water
42	0.251	-	Water
54	-	0.246	Water
78	-	0.222	Water
99	0.185	0.182	Water

Westfalia Centrifuge. A stainless steel centrifuge, prototypical of the unit proposed for Hot Semiworks HAP, IAP de-entrainment, was operated to separate dispersed water from Soltrol -- 30 per cent TBP. A clear organic effluent was obtained at feed rates up to 2.25 ± 0.25 liters per minute, a capacity that should be more than adequate for Hot Semiworks service. Pertinent data for the unit are tabulated below:

Model	Westfalia, Type LWA-205
Type	Disc Bowl
Inside Diameter of Bowl	4-7/8 inches
Bowl Rotational Speed	12,000 rev./min.
Maximum F/G (at bowl wall)	10,000
Liquid Hold-up Volume (total)	347 ml.
Aqueous Hold-up (Sp.Gr. = 1.0)	245 ml.
Organic Hold-up (Sp.Gr. = 0.833)	112 ml.
Interface Diameter	3.2 inches
Interface F/G	7,500
Material of Construction	Type 316 SS

Teflon Bellows. The deep convolution, John Dore Company Type E-8-A, three-inch inside diameter bellows has been operated for 7×10^6 flexing cycles to date without failure. This unit is being tested at 150 cycles per minute with 15 to 25 psi. internal pressure. In view of the fact that Teflon, while quite flexible, is slow to recovery, this test is very severe when compared to Hot Semiworks operating conditions where a maximum flexing frequency of approximately 80 cycles/min. will be employed.

The most recent experience with Teflon indicates that considerable shrinkage caused by stress relieving after machining can take place. It had been noted previously that the face-to-face relaxed dimension of Teflon bellows varies and is always less than the manufacturer's stated

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value by about 1/4 inch. This phenomenon has recently been noted on the inside diameter of the bellows received. For example, bellows measuring 3-13/16 inside diameter when received were within $4 \pm 1/32$ inches when inspected at the fabricator's plant.

Instrument Development. Dip tubes operated in a six-inch diameter side pot connected to the bottom of the prototype HC Column with 1/2-inch lines gave a satisfactory signal at all frequencies when a simulated interface was measured. However, when a true organic-aqueous interface was employed erratic results were encountered. A standard Republic D/P transmitter was used for all testing. An effort to define the pressure conditions at the dip tubes under various column conditions was under way at month end.

REDOX DEVELOPMENT

Process Chemistry

Solids in the IB Overflow Line. Several times during the past month the overflow line from the Redox Plant IB Column to the IC Column became plugged sufficiently to limit the plant capacity below the desired processing rate. During the last line flush made, a sample of the solids present in the line was obtained. The solids had the appearance of scale deposits. They were brown in color, non-magnetic and extremely radioactive. They had a bulk density of about one. Spectrographic and wet chemical analyses showed iron as the principal metallic constituent.

The solids were rapidly and completely dissolved in $\text{HNO}_3\text{-H}_2\text{O}_2$ and $\text{HNO}_3\text{-HF}$ mixtures. Oxalic, hydrochloric and nitric acids also dissolved them, although less rapidly. On the basis of laboratory tests with the above sample, a 5 per cent H_2O_2 - 20 per cent HNO_3 solution is recommended for plant use (at ambient temperature) for dissolution of these solids. It appears that the solids resulted from a slow deposition of ferric oxide from iron-containing aqueous solution entrained in the IBU rather than from formation of an "iron-aluminum" complex which would result if the IB Column was operated under acid deficient conditions.

Ferrous Ammonium Sulfate Quality. Further laboratory studies have shown the previously reported low ferrous/ferric ratios observed in Redox Plant IBX solutions prepared using ferrous ammonium sulfate (FAS) supplied by the Cascade Chemical Company to be in error. Correct ratios are about 30 which compare favorably with similar ratios observed for the FAS currently used at HAPO. Attempts to relate observed formation of filterable activity in the Uranium Recovery Process product streams to the brand of FAS used in the preparation of scrub solutions indicated that the Cascade FAS is not inferior in this respect to brands of FAS now in use.

URANIUM RECOVERY DEVELOPMENTProcess Chemistry

Filterable Ruthenium Activity. Although a caustic flush of the TBP Plant second cycle equipment resulted in a sharp reduction (from 500 to 100 per cent of the gamma activity of aged natural uranium) in the amount of radioactivity (95% Ru) associated with the final uranium product, 20 to 30 per cent of the residual activity is filterable. Filtration of first and second cycle solvents has shown no evidence of entrained activity. Plant solutions of ferrous ammonium sulfate, HNO_3 , Na_2CO_3 and demineralized water, when tested under extraction column conditions, showed no significant tendency to produce filterable activities.

A gamma scan of an intensely radioactive crud isolated from ROF solution (sampled June 30, 1955) showed the activity to be 82 and 18 per cent Ru and Zr-Nb, respectively. Major constituents of the crud (spectro-graphic analysis) were Al and Ca with moderate to strong (0.01 to one wt. per cent) amounts of Ba, Cr, Cu, Fe, Mg, Mn, Na, Pb, Ti, Zn and Zr.

Filtration of plant RAF through glass wool was found to remove radioactivity (largely Zr-Nb, Ce and Cs and ca. 10 per cent Ru). The activity was not removed from the filter by washing with water and acetone. Although not currently a plant problem, laboratory studies are being continued on the filtration of radioactive materials present in Uranium Recovery Process solutions.

Solvent Washing Agents. Three per cent Na_2CO_3 , 1, 5, 10 and 20 per cent NaOH, 3 and 5 per cent Na_3PO_4 , and 5 per cent NaH_2PO_4 were compared as RCW washing agents. No significant differences were found in the washed solvents on the basis of dilute uranium distribution ratios or dispersion and disengaging times. However, both Na_3PO_4 and NaOH were superior to Na_2CO_3 , by factors of from two to four, on the basis of gross gamma decontamination factors.

UO_3 Reactivity. Hydrofluorination reactivity conversion ratios were determined as a function of reduction and hydrofluorination temperatures for samples of UO_3 powder produced in a fluidized bed reactor at ANL. The reactivity ratio for these powders under standard conditions (reduction at 590°C ., hydrofluorination at 410°C .) was 1.3. Hydrofluorination at 590°C . reduced the reactivity ratio to 0.8 while reduction at 800°C . and hydrofluorination at 600°C . reduced it to 0.6. These reductions in reactivity ratio at increased reaction temperatures are similar to those previously reported for HAPO continuous calciner powders. Hanford pot powder reactivity ratios are not significantly affected by similar increases in reaction temperatures. ORNL pilot plant data indicate poor conversion to UF_4 for $(\text{NH}_4)_2\text{U}_2\text{O}_7$ powder. Reactivity ratios for $(\text{NH}_4)_2\text{U}_2\text{O}_7$, $\text{UO}_2\text{C}_2\text{O}_4$ and UO_4 powders were found to be unaffected by high reduction temperature. The effect of increased hydrofluorination temperature will be studied.

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Shake down runs are continuing in the 3-in. diameter by 1-ft. long laboratory scale continuous calciner. Packing gland failures, off-gas line plugging and difficulty in maintaining constant feed rates have been encountered. However, preliminary data from runs completed to date indicate that UO_2 powders similar to those made in the 321 Bldg. 16-in. diameter semi-plant scale calciner can be produced.

WASTE TREATMENT DEVELOPMENT

Process Chemistry

Iodine Emission. The release of iodine from a silver reactor as a function of atmosphere and temperature was studied employing a laboratory-scale silver reactor packed with plant-coated berl saddles. Radioactivity inert iodine traced with I^{131} was volatilized from KI solution by contact with concentrated HNO_3 and the I_2 so formed was swept into the reactor by a stream of air and NO_2 . Gas phase temperatures within the reactor were held to within $\pm 3^\circ C$. of the desired temperature. Iodine emitted from the reactor was trapped in caustic scrubbers.

No emission of iodine has been observed with air only passing through the reactor at temperatures ranging from 25 to $220^\circ C$. With air- NH_3 mixtures ranging from 10 to 95 per cent NH_3 , no appreciable iodine emission occurred at 200 and $220^\circ C$. except for 95 per cent NH_3 at $220^\circ C$. With 14% NO_2 -86% air mixtures some iodine emission occurred at 120, 150 and $220^\circ C$.; the most rapid emission occurred at $150^\circ C$.

Chemical Engineering Development

Silver Reactor Studies. A 4-in.-diameter by 2-ft.-high silver reactor has been operated in the 321 Building for removing "cold" iodine (partial pressure up to 1 mm. of mercury) from air at superficial vapor velocities below 1 ft./sec. through the reactor. The reactor temperature was varied from $60^\circ C$. to $160^\circ C$. The 2-ft. depth of packing was not sufficient for complete removal of iodine under the test conditions, the best run showing only 80% to 90% removal. The life of the packing was good; 65% of the available silver nitrate was reacted in one run without apparent loss of efficiency. To date no positive evidence of channeling has been observed. Point samples of coating scraped from the packing at the same level in the bed show negligible differences in iodine content except where they were contaminated with an apparent corrosion product. A brown material formed on stainless steel surfaces exposed to iodine vapor at temperatures below approximately $100^\circ C$. (above $100^\circ C$. there was no appreciable attack). This corrosion product contains 26% iodine by weight, is semi-fluid at room temperature, and liquid at $100^\circ C$. The corrosion product drips onto the packing from overhead surfaces and also contaminates packing in contact with stainless steel wherever the temperature is below $100^\circ C$.

Air-Lift Circulation for Waste Tanks. In cooperation with the Design Section, air-lift circulation of boiling simulated Purex waste was studied in a 12-ft.-deep tank using draft tubes of 5, 10, and 15 inches diameter and 5 and 10 feet long. Liquid waste volume circulation rates up to 100 times the air flow rate employed were obtained in a totally submerged draft tube 10 feet long. Maximum flow ratios (vol. liquid/vol. air) occurred below 3 cu.ft./min. of air/sq.ft. Above this air flow rate, splashing and misting became excessive. Submerging the draft tube 5 feet below the liquid surface did not materially change the flow rate and did reduce splashing, but a positive discharge head formed by the top of the draft tube extending 1 to 3 ft. above the liquid level reduced the liquid flow appreciably. The flow ratio for a boiling liquid was approximately twice as great as that for a cold liquid. Flow increased in proportion to the square root of the length of the draft tube. Steam, instead of air, was an unsatisfactory prime mover for a circulating draft tube, producing low flow rates and intermittent geysers.

MISCELLANEOUS SEPARATIONS PROCESS DEVELOPMENT

Process Planning

Processing Irradiated Fuel Elements from Power Demonstration Reactors. Currently, the A.E.C. is considering several nuclear-power plant proposals from utilities -- private and public. The total reactor power represented by these proposals is about 2,000 to 3,000 MW, most of which will be operating by 1960. In addition, the A.E.C. is engaged in a Reactor Development Program which would produce about 1000 MW (exclusive of the Savannah River and Hanford reactors) by 1960.

In connection with this program, a brief survey has been made of the ability of H.A.P.O. separations facilities to process spent fuel from these reactors.

The technical and economic feasibilities of processing any of twenty-one different fuel elements encompassing a wide variety of chemical compositions (pure uranium to 95.7 zirconium-rich uranium-zirconium alloy), cladding materials (aluminum, stainless steel, and zirconium), geometries (pins, plates, and rods), enrichments (0.3 to 93% U-235 in U-238) and discharge rates (0.002 to 750 tons per year) have been explored. The processing capabilities of both the Redox and Hot Semiworks were considered in detail, and are discussed briefly below.

Hot Semiworks Capabilities. The addition of facilities at the Hot Semiworks to dissolve zirconium and stainless steel alloys present in most of the above power reactor fuels would permit the processing of any of the fuels with low enrichments (less than about 2% U-235) at rates up to 25 tons per year. The total investment required for special dissolver facilities is very roughly estimated in the range of \$500,000 to \$1,000,000.

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Additional processing capacity up to about 125 tons per year could also be furnished with an additional expenditure of approximately \$1,000,000.

Operating costs, exclusive of amortization of capital investment, are estimated at \$20 to \$25 and \$4 to \$6 per pound of uranium recovered at annual rates of 25 and 125 tons, respectively.

Redox Capabilities. The Redox Plant offers the greatest potentialities of the H.A.P.O. 200 Area production facilities for processing power reactor fuel elements -- primarily because the aluminum nitrate salting agent employed is capable of complexing the residual corrosive agent used in the dissolution of stainless steel and zirconium alloy fuels.

Redox processing capacity by blending (with current H.A.P.O. production) ranges from about 200 tons per year of 2% enriched uranium to 2500 tons per year for natural or depleted uranium. Special dissolver facilities for the dissolution of zirconium or stainless steel alloy fuels could probably be constructed for about \$5,000,000 to \$10,000,000.

Processing costs for the power reactor fuels, exclusive of amortization, are estimated at about \$1.50 per pound of uranium for all processing steps except dissolution, plus about \$1.00 per pound for the new dissolver facilities, on the basis that the total cost of operating the new dissolver facilities would be charged to the power reactor fuel. The cost for all steps except dissolution is assumed pro-rated between the power reactor fuel and routine Hanford production which would also be processed through the Redox Plant, making a combined annual processing rate of 2500 tons.

Separations Equipment Development

In-Line Chemical Instrumentation

Iodine Monitor. A gamma scintillation off-gas iodine monitor prototypical of the unit recommended for installation at Redox and Purex has been constructed. This unit will be installed at "T" Plant replacing the unit installed for feasibility testing. The new unit isolates the counting chamber from the main flow of gas and is equipped with air sparge and chemical flush auxiliaries.

Operation of the original T-Plant monitor was promising; however, excessive build up of activity on the surface of the monitored spool piece, and electronic instability caused by severe temperature changes, pointed up weaknesses which are being corrected in the new design. Accurate background determination will be required for accurate iodine determination, and a low background must be maintained to assure the desired precision.

Cold Semiworks Gamma Monitor. A zirconium gamma monitor was put in service in 321 Building to aid the pulse column program employing zirconium tracers. This unit is employed to obtain on-the-spot analyses for Zr tracer during pulse column runs, enabling rapid determination of changing decontamination performance.

MISCELLANEOUS EQUIPMENT DEVELOPMENT

Recuplex Model-E Chempump. The spare pump unit equipped with a 30 mil. thick rotor casing was put through 540 start-stop cycles, wherein, it proved to be satisfactory for this service also. It was previously reported that the unit requires 125 per cent of the power required when the rotor was encased in a 10-mil.-thick can. This unit has now been installed in the Recuplex facility. The remaining spare pumps are scheduled for similar modification after which functional tests will be made before they are installed in the plant.

Materials. "Fluoroflex-T", Teflon-impregnated glass cloth material is being flexed to determine the feasibility of using this material for diaphragms in valves wherein the diaphragm is subjected to process solutions and flexing. The material undergoing test was taken from a tubing sample provided by Resisto-flex, Incorporated.

~~CONFIDENTIAL~~CHEMICAL RESEARCH SUB-SECTIONPUREXMini Decontamination Studies

A laboratory-scale solvent extraction plant capable of processing Hanford level feeds through two cycles of solvent extraction was placed in operation during the month. This facility consists of a shielded dissolver with attendant off-gas scrubbing facilities, feed make-up and storage facilities, a shielded 21-stage miniature mixer-settler unit (Mini), and four unshielded miniature mixer-settler units. The Purex operation can thus be simulated from the dissolving step through the HA-HC and the 1A-1B-1C cycles. A remote sampling device permits sampling of the organic phase in each of the 21 settling stages of the shielded Mini unit.

Two runs were made in this unit to study the extraction behavior of the zirconium tracer which is being used in pulse column decontamination studies currently in progress in the Chemical Development Sub-Section. The zirconium species present in this tracer are apparently more readily extracted by TBP than is the bulk of the zirconium present in dissolver solution. Decontamination factors over the HA column were only 10 when eleven Mini scrub stages were employed and 8 when seven Mini scrub stages were used. In earlier Mini studies zirconium decontamination factors of the order of 1000 were obtained over the HA column with feeds prepared from either Redox or T plant dissolver solutions.

A two-cycle Purex run was made with the objective of establishing base-line decontamination performance for the new Mini unit and to provide a comparison between freshly prepared laboratory 30% TBP-Soltrol 170 solvent ("CP Solvent") and 30% TBP-Soltrol 170 solvent which had been employed in run PX-6 in the Hot Semi-Works. Feed for this Mini run was prepared from dissolver solution (866 MWD/T metal cooled ca. 200 days) obtained from the Hot Semi-Works during run PX-6. The Semi-Works dissolver solution was diluted five-fold with cold uranium and nitric acid in preparing feed for this run.

First cycle runs (HA-HC) were made on the HW #2 Flowsheet with both "CP Solvent" and Hot Semi-Works solvent. In both cases eleven Mini scrub stages and ten Mini extraction stages were employed in the HA Mini unit. The HCP resulting from the first cycle run with "CP Solvent" was concentrated batch-wise and processed through the 1A-1B-1C cycle, likewise on the HW #2 Flowsheet.

Decontamination factors obtained were as follows:

	Solvent	Log dF			
		Ru	Zr-Nb	Beta	Gamma
HAF to HAF	"CP"	3.22	3.48	3.95	3.60
HAF to HAF	HSW	2.68	2.93	3.30	3.00
HAF to HCP	"CP"	3.48	4.00	4.20	3.97
HAF to HCP	HSW	2.95	3.43	3.48	3.40
HAF to LCU	"CP"	--	--	6.24	6.20

	HAF Gamma Spectrum		
	Ru	Zr	Nb
"CP"	67%	13%	20%
HSW	65%	15%	20%

The LCU resulting from the two-cycle run with "CP Solvent" was well within present uranium product specifications.

Organic profile data indicate certain differences in behavior of "CP Solvent" and the Hot Semi-Works solvent. For example, zirconium is less efficiently scrubbed when HSW solvent is employed. With this solvent zirconium scrubbed at a relatively constant rate corresponding to a decontamination factor of 1.33 per Mini stage over the entire eleven scrub stages. With "CP Solvent" the zirconium scrubbed more rapidly (at a rate corresponding to an average dF of 1.98 per Mini stage), but scrubbing effectively ceased after ca. six Mini stages. Behavior of ruthenium was similar, the scrubbing efficiency being greater with the "CP Solvent." With both solvents ruthenium scrubbing persisted only through eight Mini stages. It was also noted that HA extraction section decontamination factors were lower by a factor of about two with Hot Semi-Works solvent.

A sample of 1AF obtained from the Hot Semi-Works during run PX-6 was processed through a 1A-1C Mini cycle on the HW #2 Flowsheet with "CP Solvent." Using eleven Mini scrub stages and ten Mini extraction stages decontamination factors of 370 for gross beta and 790 for gross gamma were obtained over the 1A unit. A gross gamma decontamination factor of ca. 60 had been obtained on this material in the Hot Semi-Works HA-HC cycle.

The scrubbing efficiency for zirconium in this run was virtually identical with that observed in the first cycle run with "CP Solvent" discussed above. The ruthenium scrubbing efficiency was slightly lower in this run than in the first cycle run.

Recovery of Solvent by Steam Distillation

The feasibility of purifying solvent by steam distillation was tested with process solvent obtained from the Uranium Recovery plant. The feed material

had an optical density of 1.5 at 400 mμ and a "C" contact E_a^0 (U) value of 0.03. Steam distillation to the 92 percent recovery level resulted in a color improvement factor of 18 and a "C" contact E_a^0 (U) value for the composite distillate of 0.003. On the basis of the very low "C" contact value for this distillate, it is believed that steam distillation holds promise as an alternate solvent recovery process. Long-term distillations in which recoveries of 99 percent and greater could be obtained would be required to verify this, however, and such studies do not appear feasible with the present laboratory set-up.

Earlier studies of steam distillation of chemically damaged solvent employed as feed a composite of a number of samples of chemically degraded solvent in which several hydrocarbon diluents were represented. Since it was thought that degradation products of different diluents might behave differently, the experiment was repeated employing as feed a sample of 30% TBP-Soltrol 170 which had been subjected to exposure to a mixture of nitric and nitrous acids for two days at 100 C. This material had a "C" contact E_a^0 (U) value of 0.68. Distillation to the 90 per cent recovery level resulted in a product with a "C" contact E_a^0 (U) value of 0.06. This factor of ten improvement in "C" contact value is about three-fold greater than was obtained in the earlier study with the composite feed.

NEW PROCESSES

A review of the literature on chemical separations techniques and processes is currently in progress with the objective of outlining areas in which research might be expected to yield a more economical Hanford chemical separations process. Plans in this connection are at present necessarily tentative, but areas in which research currently is deemed desirable include a search for volatile plutonium compounds, studies of the solubilities and other pertinent properties of the actinide metals in non-aqueous solvents, and studies employing "inorganic" ion exchangers.

Some consideration is also being given to solvent extraction systems other than the nitrate system. Preliminary studies indicate some potential advantages in an extraction process employing TBP solvents and plutonium and uranium chlorides in hydrochloric acid. Distribution coefficients for UCl_4 into 30% TBP solvents have been measured as a function of hydrochloric acid concentration. In the region of 1.1 to 1.2 M UCl_4 in the aqueous phase the uranium extraction coefficient (organic/aqueous) is very low below ca. 6 M chloride but increases rapidly between 6 M and 8 M chloride. Work at the Argonne National Laboratory indicated significantly greater distribution ratios for the troublesome fission products in the region of 6 M to 8 M total chloride than were found for U (IV) in the present study. Thus there is some basis for optimism that a "pre-extraction" step might serve to extract the troublesome fission products (Zr, Nb, Ru, Sb-125) away from UCl_4 . A tracer experiment indicated a distribution ratio (organic/aqueous) of 5.2 for antimony-125 (a limiting contaminant in the Argonne work) at a chloride concentration of 7.1 M, where the distribution ratio for UCl_4 is well below 0.1.

It is planned to explore the feasibility of such a "pre-extraction" decontamination step in batch extraction-scrub studies employing full-level fission-product activities.

Seven extraction and five scrub stages were employed. The thorium waste loss was ca. 0.8 percent. A waste loss of this magnitude is not considered prohibitive in view of the difficulty of obtaining decontamination in such a column in the absence of a phosphate-containing scrub.

WASTE TREATMENT

Fission Product Recovery

Excellent scavenging of cesium (decontamination factors greater than 100) with pre-formed nickel ferrocyanide has been obtained from sodium nitrate solutions (up to 1 M) over the acidity range: 1 M HNO_3 to pH 10. Scavenging from 10 M HNO_3 or 1 M NaOH varied from poor to excellent in presumably identical experiments. Further experiments are in progress under more carefully controlled conditions and simulating Purex HAW composition. As a cesium scavenging agent, preformed nickel ferrocyanide is as good in acid solution and better in alkaline than the coformed salt. Although addition of ammonium ion reduces cesium scavenging, ammonium ion was found to be quantitatively effective as a leaching agent only at high concentration (above 1 M) in alkaline solution.

Incidental to fission product recovery, the recovery of plutonium from Purex waste was investigated for possible routine use or application to off-standard, high plutonium loss waste. Recovery of more than 95 percent of the plutonium from synthetic Purex LW is achievable by passing the solution, without pretreatment, through a Dowex-1 anion exchange column. Consistently good recovery was obtained with 0.01 to 5 mg Pu/l (2 mg Pu/l $\cong$ 0.1% loss) passed through 2 to 5 cm bed depths of Dowex 1- x2 (100-200 mesh) or Dowex 1- x8 (50-100 mesh) resin. Recoveries increased from 95 to better than 98 percent on decreasing flow rates from 35 to 2 ml/min/cm² (500 to 30 gal/hr/ft²). Resin capacities were not determined, but these recoveries are good for the passage of at least 1000 bed volumes. This method should be fairly selective for plutonium since it is dependent on removal of anionic species, not cations. Although iron was found to constitute an interference in batch scavenging experiments, it does not do so in column operation. No further research on this subject is currently planned.

Waste Disposal

On neutralization of Redox waste preparatory to underground storage, the major constituent, aluminum nitrate, reacts as follows

Thus, the bulk of the caustic consumed and of the salt produced for storage is attributable to the nitrate content of aluminum nitrate. Two methods have been investigated for the prior separation of this nitrate: (1) electrolytic salt-splitting, and (2) electrolytic reduction. Salt-splitting can be accomplished using an anion exchange membrane to separate the cathode and anode compartments.

In preliminary laboratory experiments, reduction of the nitrate content of synthetic Redox LAW to 40 percent of its initial value was achieved with an electrical consumption of 8 kwh/gal using a cell operated with 6 volts at 60 C. The nitrate is recovered as nitric acid in the anode compartment (along with dichromate).

In preliminary electrolytic reduction experiments, approximately the same nitrate reduction was accomplished with the expenditure of 5 kwh/gal for electricity. In this process no compartmentalization of the electrolysis cell was required. However, cupric ion catalysis is desirable to avoid hydrogen evolution, removal of dichromate (e.g., as PbCrO_4) is necessary, and the nitrate is lost as nitrogen oxides and ammonia. Further investigation of these methods for volume reduction of Redox wastes is planned as well as the direct decontamination of this waste with respect to long-lived fission products to permit cribbing of the bulk volume.

RUTHENIUM CHEMISTRY

Homogeneous Sulfide Carrier Precipitation

Very promising results have been obtained (decontamination factors up to 6×10^3) on continued investigation of carrier precipitation of ruthenium with copper sulfide produced with the homogeneous sulfide source, Sulfi-down (stabilized thioacetamide). Difficulty with copper sulfide redissolution can be circumvented under certain acidity conditions by addition of sulfamic acid, presumably through its inhibition of nitrate-nitrite oxidation of sulfide. Thus, ruthenium removal from 1 M NaNO_3 -0.4 M HNO_3 is erratic and generally poor from 50 to 95 C (only 2 of 12 experiments yielding decontamination factors greater than 5), but on addition of 0.05 M sulfamic acid the ruthenium decontamination is consistently high, increasing from 100 after 1/2 hour to 6×10^3 after 4 hours heating at 75 C.

Comparably favorable results were obtained with simulated dissolver solution, 2 M UNH spiked with dissolver solution and 5 g/l $\text{K}_2\text{Ru}(\text{NO}_2)_6$ carrier, on addition of 0.01 M $\text{Cu}(\text{NO}_3)_2$ -0.05 M HSO_3NH_2 , heating to boiling and adding 0.05 M Sulfi-down. The ruthenium decontamination factor passed through a maximum of 6×10^3 after one hour and was still above 1×10^3 after 4 hours contact. However, dissolution of copper sulfide occurred rapidly in a similar solution made 1 M HNO_3 , despite the presence of sulfamic acid. Analyses from experiments at intermediate acidities are not yet available. Further investigation will be directed toward defining the effects of acidity, other sulfide carrier precipitates, full level dissolver solution, and the subsequent solvent extraction behavior of ruthenium, plutonium and uranium.

Pretreatment of Redox Second Uranium Cycle Feed

Digestion of simulated Redox 2DFS with ammonium thiocyanate for 3-1/2 hours at 65 C lowered the ruthenium extraction coefficient ten-fold. Subsequent scrub and strip activities were below gamma-spectrometer background indicating very

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favorable ruthenium decontamination. This work will be repeated with full-level plant solutions. It should be noted that significant gas evolution occurred during the first few minutes of this thiocyanate treatment. Extraction of 2DFS immediately following thiocyanate addition without heating indicated an extractable ruthenium complex. However, the strip extraction coefficient was ten-fold higher than a control, suggesting addition of the thiocyanate to the organic at the strip step (2E column) would be desirable.

Other reagents investigated proved unfavorable. Thiourea formed an extractable ruthenium complex which also stripped out, thereby lowering the over-all ruthenium decontamination by a factor of 28 (1 extraction, 2 scrubs, 1 strip). Addition of 2-2'-dipyridyl, previously shown to increase extraction, to the organic in the strip step failed to prevent ruthenium from transferring to the aqueous phase.

Plutonium Oxidation in the Reverse Strike MnO₂ Head-End

Comparison of completeness of plutonium oxidation in AT solution to Pu(VI) by reverse strike manganese dioxide and dichromate indicated the former to be slightly better. Effectiveness of oxidation was measured by hexone extraction (four extractions of three volumes each). Differences were small, e.g., after 3/4 hours of treatment extraction was 99.94 percent for the manganese dioxide oxidized solution compared to 99.78 percent with dichromate. This concludes the experimental investigation of the reverse strike manganese dioxide head-end treatment which previously had been shown to give very favorable zirconium-niobium decontamination while minimizing ruthenium volatilization.

SILVER REACTOR

Recommendations have been made and shown to be effective on the basis of plant tests for prevention of two types of iodine emission from silver reactors. Both are "displacement bursts," i.e., involve release of more radio-iodine from than enters into the reactor, and have resulted in emission of a few curies during a brief operating period on several occasions. The first type occurs during coating removal and was shown by laboratory tests to be due to vigorous reaction of ammonia with silver nitrate with resulting particulate transport of iodine previously deposited in the reactor. The recommendation in this case is to maintain the reactor temperature during coating removal below 190 C (375 F), the approximate threshold temperature for the aforementioned reaction.

The second type of displacement burst proved more difficult to explain, occurring when the dissolver heel was in contact only with sodium nitrate solution prior to coating removal, presumably with no gas but air passing through the reactor. Further, these bursts occurred only from the Redox C-3 reactor (except for a few smaller emissions recently observed from B-3). Preliminary analysis of the plant sodium nitrate indicated 0.4 percent chloride which, if evolved as HCl or NOCl, would be expected to displace iodine from a reactor. However, laboratory tests

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simulating plant operation prior to coating removal indicated negligible chloride gas evolution. Instead, a small but rapid release of iodine was noted. Re-analysis of the sodium nitrate showed 0.013 percent iodide as iodate, in retrospect not surprising considering the Chilean source of this material. Evidently the iodate is reduced by the uranium heel to iodine, some of which is evolved and exchanges with the silver iodide in the reactor to release radio-iodine. That this occurs primarily in the Redox C line is probably due to a combination of features peculiar to this system including sparging and high acidity of the dissolver and the relatively small capacity of the C-3 reactor. The recommendation in this case is to prevent the pH-sensitive iodate reduction by addition of caustic to the dissolver. No bursts of this type have occurred since plant adoption of this practice during the latter part of this month.

There remains the major problem of removing radio-iodine from the dissolver off-gas during the slug dissolving step. The possibility of using the AgI-I_2^* exchange reaction is under consideration. Evidence for such exchange is indicated by the pre-coating removal bursts and, more directly, by experiments at 150 C conducted by Russian investigators. The rate of this exchange at higher temperatures will be investigated.

The use of silver metal at elevated temperature (e.g., 350 C) is also under study since silver iodide's stability in a nitrogen dioxide atmosphere is thermodynamically predicted to increase with temperature, and since silver nitrate cannot be used above its melting point at 210 C. Further, ammonia would not be expected to react with Ag-AgI at 350 C. Preliminary experiments with such a silver metal reactor indicate a good efficiency for iodine removal and also high utilization of the silver deposited on Berl saddles.

Continued investigation of the silver nitrate-iodine reaction at 185 C showed a significant reduction in the product iodide/iodate ratio with increasing oxygen concentration of the carrier gas, as predicted. Substitution of nitrogen dioxide caused a very considerable reduction in iodine absorption, again as predicted, with a very high iodide/iodate ratio resulting. Future studies will emphasize determination of the residual iodine vapor pressure, since this is the point of primary interest and since iodide/iodate ratios observed thus far indicate no simple stoichiometry for the silver nitrate-iodine reaction.

URANIUM PROCESSING

Flurex

Assembly of equipment to determine the behavior of fission products in the Flurex process is almost complete. A sample of Redox IBU has been obtained; the uranium and fission products have been stripped into an aqueous phase and will provide the feed solution for these studies.

Chemical Preparation of Uranium(IV) Fluoride

The study of the reduction of uranyl nitrate by ferrous iron in the presence of HEDTA (hydroxyethylethylenediaminetriacetic acid) has been continued. Best

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results were obtained when UNH was added to a solution of FeCl_2 -HEDTA neutralized with sodium hydroxide to a pH of 1.9 to 2.1. Approximately one hour was required for complete reduction to take place. Hydrofluoric acid was then added to the reduced uranium solution to precipitate sodium uranium double fluoride. This product was washed first with dilute hydrofluoric acid and then with a dilute solution containing boric acid and sodium thiocyanate. It was then dried for 24 hours at 110 C yielding a free flowing powder which on analysis contained less than 0.1 percent iron. Uranium and sodium analyses are not yet available.

Uranyl nitrate was successfully reduced in a "Jones" type reductor consisting of a column of lead shot. Difficulties in early experiments indicated that successful operation hinged on some means of preventing the formation of lead precipitates in the reactor and of preventing the reoxidation of the reduced uranium. Acetic acid was the most satisfactory reagent tried for solubilizing the lead, and the addition of a trace of urea suppressed nitrite so that no reoxidation occurred. The reduced stream from the lead reactor was passed immediately into a solution of dilute sulfuric acid to effect separation of the lead as lead sulfate. The sodium uranium double salt was then precipitated from the supernate by addition of a hydrofluoric acid-sodium fluoride mixture. The final filtrate contained no visibly detectable uranyl ion. Some samples of these salts were quite crystalline, but all were satisfactorily reduced to uranium metal by the usual bomb reduction technique.

ISOTOPE SEPARATION

The previously reported effect of temperature gradient on the uranium isotope separation factor by thermal diffusion techniques was substantiated by further data. In addition, it was determined that the approach to equilibrium was 25 to 30 times faster when the temperature gradient was 90 C as compared to 45 C. A repeat run with the large temperature gradient (ca. 90°) gave similar results to the previous one. Besides confirming the earlier experiment, this experiment assured that no change had occurred in the characteristics of the 0.25 mm column. A 25 HP refrigeration unit will be ready some time in September to extend the temperature range and further study the temperature gradient effect.

Some of the analytical results from the ion exchange experiment studying the exchange equilibrium between U(IV) resin and U(IV) chloride at pH 1.6 have been received. Unfortunately, no firm conclusions can, at present, be drawn because of anomalies in the data; however, significant depletion appears to have occurred in one of the five processing stages, perhaps because of an unknown variation of the conditions. It is hoped that additional analyses will clarify the anomaly.

The "sharp band" experiment with plutonium has progressed satisfactorily. The original band containing 0.5 grams of plutonium(III) has been eluted through 20 band lengths of resin in the copper form. The resin used was Dowex 50 x 12, 50 to 60 mesh. The elutriant was versene neutralized to pH 8 with ammonium hydroxide. Samples will be submitted for isotopic analysis at KAPL.

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In an experiment similar to the one described by Haeffner and reported in a previous monthly report, no significant separation of mercury isotopes was found after 40 days of operation. In this particular experiment, the current density was considerably less than that used by Haeffner. A 100 ampere power supply has been procured as well as some gallium metal, and these will be used to further study this effect.

Sulfosalicylic acid was used as the complexing agent in an isoelectromigration experiment which resulted in an enrichment of U-235 at the cathode (0.2 percent relative to natural uranium in 3.75 percent of the charge) and a depletion of U-235 at the anode (0.1 percent in 7.3 percent of the charge). Intermediate samples resulted in values lying between the end samples. The total charge was 14 grams as uranium; 0.27 Faradays of current were passed in a period of 145 hours. Voltage was ca. 300 V and the current about 50 ma.

After many mechanical difficulties, a 60 hour fused salt electromigration run was completed using the system PuCl_3 - LiCl-KCl . The run demonstrated the feasibility of operating at 800 C, although some difficulties were encountered. A partial void in the salt column resulted in erratic current passage; also, rather severe anode attrition occurred. This attack on the graphite occurred well above the surface of the molten salt and is believed due to the action of air plus chlorine. Samples for isotopic analysis will be submitted to KAPL.

ANALYTICAL DEVELOPMENT

An emission spectrographic method for U-235 isotope determinations, previously developed and reported in Document HW-32843, was set up for plant application during the past month. The method will be used for the routine receiver accountability analysis of slightly enriched uranium fuel elements. This method is rapid and requires no new apparatus; the precision for an average of four determinations is about ± 5 percent. Samples representing a shipment of uranium having one percent U-235 were analyzed by this method as well as by mass spectrometer; the vendor's value was confirmed within method precision in both cases. The mass spectrometric method used for the above analysis was unique in that the sample was blended with a depleted uranium standard to yield a mixture having nearly normal uranium isotopic composition. This blend was analyzed, and the value of the unknown calculated. The advantage of this technique is that the blended sample fell into the ordinary range of the mass spectrometer, and a costly shutdown and clean out of the instrument to prepare it for an analysis of an enriched sample was avoided.

Calibrations for six elements in plutonium on a 325 Building spectrograph were completed in order to make higher precision analysis available, and "gloved box" facilities in the 325 Building for plutonium metal analyses are about 80 percent complete.

Spectrographic methods for metallic elements in water have been made available for routine service. The ion exchange-spectrographic method which has been

under development for several months is being used for determining the elements iron, chromium, nickel, and zirconium in water for closed loop pile water studies requiring high precision analyses at a level of a few parts per billion. This method was compared with the boil down-colorimetric procedure on standards and samples, and it was found to be more accurate at the lower levels and more rapid. A colorimetric method is not available for zirconium.

Some additional work was done on the spectrographic gallium method (parts per million range) in the 234 Laboratory. The method has been used for a few samples, and the average precision appeared to meet the expected value of ± 10 percent for four values. A spectrographic source enclosure for the analysis of radioactive samples was completed and put into operation in the 325 Building during the month.

A study of modifications to the nitrite method for uranyl nitrate solutions has been made. Past practice has been to determine the nitrite colorimetrically after separating it from uranium and fission products by distillation. In this study, it was found that acceptable results can be obtained for Purex HAF samples with a direct colorimetric determination providing that the standards are prepared with the same concentration of uranyl nitrate as the samples. Using a spectrophotometer, a 5 microliter sample of HAF is sufficient, and precision is better than ± 50 percent. A spot plate technique was tried, but the sample size required to obtain enough precision was too large.

UO₃ REACTIVITY

Studies of the structural characteristics of UO₃ using x-ray diffraction have resulted in a collection of diffraction patterns from nearly a hundred samples of a wide variety of types. Nearly all production pot samples, continuous screw calciner samples and laboratory produced UO₃ are of the orthorhombic type with small variations in the x-ray diffraction patterns. Exceptions are that unique diffraction patterns are found for samples of continuous screw calciner lots produced at temperatures below 230 C, samples made in the laboratory with very high sulfate or urea additions and flash calcined samples. The latter two methods yield nearly amorphous powders with poorly defined or no diffraction patterns. Sulfate addition below about the one percent level has no effect on the x-ray diffraction pattern.

The effect of annealing by long heating at about 350 C has been explored, and generally the diffraction lines become sharper, indicating either crystal growth or relief of gross crystal strain or disorder. In two cases checked, the reactivity of the specimens were lowered about 10 percent by annealing. Samples containing about one to three percent sulfate required several days at 400 C to show annealing effects in the diffraction patterns.

Some hydration studies have been made to determine the effects on diffraction patterns. A typical sample of monohydrate dried at about 300 C had the typical

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orthorhombic form but with a greatly increased reactivity over the starting material. Heating at 400 C resulted in a complete change in crystal structure, but the high reactivity was retained, whereas when the sample was heated to about 500 C, it reverted to the original orthorhombic form and the reactivity was low. A phase change at about 400 C has been observed with many UO_3 samples although it is not a general rule, and its significance is not understood. Most UO_3 powders hydrate to some degree rather rapidly in air, but after heating to 400 C they are stable and no longer absorb moisture from the air.

IN-LINE ANALYSIS

A chronic maintenance problem on the Hot Semi-Works gamma monitor console has been eliminated since the cause of an erratic input signal lead resistance was located. General performance of the gamma and photometer units during Hot Semi-Works Run No. 6 was very good. At the end of the run, the LOF, HAP, and LOOL gamma cells needed replacement because of high backgrounds, although the LOF cell has been in service through six runs. The LOOL cell which survived only one run was of fluorothene, although new fluorothene cell on the LBU monitor performed well (re background buildup) and appears superior to lucite for that stream. All of the redesigned aluminum cells performed much better than the previous model. Two polyethylene cells which were steamed to polish the inner surface were unsuccessful on the HAP stream. New fluorothene coated glass cells have been prepared for testing during Run No. 7.

The HAP uranium photometer yielded some results during Run No. 6 which differed by four percent from laboratory data, and the sensing unit will be replaced before Run No. 7. A few incidences of uranium photometer failure during the run were caused by a jet valve failure on the LAP and a few erratic LAP unit signal relays due to dirty contacts.

The two uranium polarographs were out of service during the run, apparently due to electrode failures. Operation of the plutonium absorptometer and pH units was normal.

An operating and maintenance manual for the in-line analytical instrumentation system is being prepared, and about 70 percent of the manual is printed or in the process of duplication.

In the study of gamma absorptometry for in-line analysis, an evaluation of the relative merits of thulium-170 and cesium-137 for source units is being made. Much higher sensitivity for uranium, greater precision and less shielding requirements are the advantages for thulium, although cesium-137 has cost advantages in many applications. A subject report is being prepared.

The RCU gamma monitor installation in the Metal Recovery Plant was re-evaluated, and recommendations were made for changes required because of current higher activity RCU streams.

New electronics for the iodine monitoring experiment at 221 T were assembled to provide compatability with a new chamber and instrument re-location. A gamma spectrometer system for low level radio-zirconium detection was installed in the 321 Building to assist in Chemical Development studies.

Other activities in support of in-line analysis development included correcting Purex plant in-line instrumentation drawings to provide as-built drawings, conducting orientation lectures for instrument maintenance personnel of the Purex plant on in-line instrumentation, and design of an adapter for the sample gallery gamma spectrometer of the Hot Semi-Works to permit fission product analysis of certain organic samples.

Uranium polarography studies with the HAW and LAW type solutions are continuing. Two factors which may contribute to erratic polarograms from the in-line analytical instruments were studied this month. These were the effectiveness of inert gas sparging of the sample to eliminate oxygen interference, and the affect of dissolved organic materials in the sample, and on the nitrate discharge potential. Helium gas sparging of synthetic HAW samples under several conditions showed that oxygen removal rates varied widely with the degree of gas dispersion in the sample and that the present cell design with a sintered-glass dispersion tube for helium introduction is very efficient. Organic materials added to HAW samples were TBP, DBP, MBP, butanol, ethanol, methanol, carbon tetrachloride, chloroform, and trichloroethylene, and changes in the electrocapillary zero point, nitrate discharge potential, uranium discharge potential (half-wave voltage), and uranium sensitivity were measured. The electrocapillary zero point is shifted significantly toward more positive potentials by TBP and DBP in concentrations of one part per 1000 of sample. The effect of TBP, DBP, and MBP on the nitrate discharge potential was to shift it to more negative values. The other organic materials in low concentrations had no adverse effects. However, after vigorous contacting of an excess of carbon tetrachloride with the sample, the nitrate discharge potential is decreased to the point where interference with the uranium wave occurs. This effect is pertinent because carbon tetrachloride is being used in the in-line uranium polarographs as a protective liquid in the mercury traps. Chloroform and trichloroethylene, as possible substitute liquids for this purpose, do not cause this interference.

LABORATORY SERVICES

One hundred ten thousand (110,000) gallons of "Crib" level waste was transported to 200 West Area for disposal. Average plutonium analysis was 5.1×10^{-4} uc/ml. Average gross beta analysis was 8.0×10^{-2} uc/ml.

One million five hundred thousand (1,500,000) gallons of "retention" level waste was discharged to 300 Area ponds. Average alpha activity was less than 4.5×10^{-7} uc/ml. Average beta activity was less than 8.0×10^{-7} uc/ml.

Since larger volumes of waste received at the holding facility on week ends has caused a handling problem, it became necessary to pipe the two sets of retention

basins together to prevent overflowing. About 10,000 gallons of "Crib" waste is also being received on week ends. Since none of the Works Laboratory Buildings are occupied during this period, an effort is being made to determine the source of the waste. The installation of flowmeters on crib lines from the various buildings is being considered.

During the evening of August 15 a fire was discovered at the 300 North (Technical) Burial Ground. The fire was put out by bulldozing dirt into the pit. It was also necessary to do additional grading in the immediate vicinity to cover the contamination spread by the fire.

The filter dolly used for changing CWS filters from the 325 Building exhaust system was modified to provide more adequate service. This should prevent contamination spread when filters are changed.

Difficulties with the crib loading pump at 340 Building were again experienced. Access plates were removed and pump filters cleaned out. If difficulty continues, a standby pump will be installed.

All other decontamination, building service, and laundry functions were accomplished in a routine manner.

CONTACT ENGINEERING UNIT

Recommendations and preliminary specifications were transmitted to the Project Section for a nominal 7 foot increase in the Purex Plant HA and LA Column scrub section length. The need for this equipment revision stems from the assessment of recent Hot Semi-works and research data which indicate that additional scrub section length is required to meet flowsheet decontamination values.

Site preparation work for the 224-U Building installation of the prototype continuous calciner is essentially completed. Delivery of the calciner shell and furnace unit is scheduled for mid-October.

Redox Chemical Flowsheet HW No. 5 for Phase III plant expansion was prepared by the Redox Process Unit and transmitted to the Design Section in Document HW-38684.

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ANALYTICAL LABORATORIES UNIT

General Chemical Laboratory

The burner fusion apparatus employed in the fluorimetric uranium analysis, referred to in last months report, was used exclusively during the month. Fusion by this method appears to be entirely satisfactory. In addition to mechanical advantages previously reported, there is an increase in sensitivity and differences attributed to flux variances noted in the past are eliminated. The apparatus in its present form is some what slower than the induction furnace, however, this disadvantage appears to be more than offset by the advantages indicated.

Considerable effort was expended in the performance of valence state analysis of iodine in several media. Modified conventional techniques proved adequate for all samples encountered.

Back-mixing and zirconium decontamination column studies conducted by Chemical Development accounted for a marked increase in the work volume for the laboratory. At months end, methods are under investigation to provide data on the sodium and entrained water content or organic column streams.

Radiochemical Laboratory

In support of an investigation to determine the effect of tri-butyl phosphate (TBP) and di-butyl phosphate (DBP) on the conversion of uranium nitrate to UO_3 , a study has been made to determine the concentration of these constituents in the C-1 solution (60% UNH). In the procedure the TBP is extracted into carbon tetrachloride and concentrated without loss of TBP prior to analysis. Normally the TBP is determined by infra-red estimation, however, degradation products not attributable to DBP enhance the TBP spectrum and resulted in a positive error. As a result the more tedious flame photometric method of analysis was employed. The following sensitivity-accuracy conditions apply:

	<u>TBP</u>	<u>DBP</u>
± 100% error	0.001 g/l	0.001 g/l
± 50% error	0.01 g/l	
± 25% error	0.1 g/l	0.02-0.05 g/l

Antimony is one of the most troublesome contaminants encountered in a chloride separation process. Scoping samples were submitted by Chemical Research for antimony assay. The feed was dissolver solution of uncertain history about one per cent (1%) of whose gamma activity consisted of Sb-125. A Los Alamos method (LA-1721) was adapted and confirmed. Purity of separation was excellent as shown by gamma spectrometry. Principle of the separation is distillation of antimony as the tri-bromide.

Spectrochemical Laboratory

The enclosed and shielded source for radioactive samples was completed early in the month. The source and spectrograph have been utilized for the examination and analysis of "active" dissolver solution and solid by-product samples for the Redox process. This equipment is now available for the examination of other active liquid and solid plant samples.

All equipment and material for the Spectrochemical Assay of Plutonium has been acquired or is on order. The facilities for this analysis are approximately 75% complete.

Mass Spectrometry

Construction of a sample manifold and inlet system to the Consolidated-Nier mass spectrometer, to measure total dissolved gas in water samples taken at 2000 lbs. per sq.in., was completed during the month. Calibration and testing of the system is incomplete. It is expected that this equipment will provide a means for determining the composition of gases in water from the 100 Area experimental coolant loops.

Two mercury samples were analyzed for isotopic content using the sampling system mentioned in last months report.

The U-235 content in an enriched sample was determined by blending the oxide with depleted material to bring it within the range of natural uranium and comparing it against a natural uranium standard. Excellent results were obtained. The method will be used since it eliminates the need for a wide range of standards and avoids extensive down-time to clean the spectrometer source when widely different sample concentrations are introduced into the spectrometer.

Crucible and heat shields prepared from pile graphite have been used with complete satisfaction in the vacuum fusion apparatus. This grade of graphite out-gases smoothly and rapidly. The vacuum fusion technique has been employed in the determination of oxygen in zirconium metal. The "dry" crucible technique was discarded because of irregularities in the operation and has been replaced by the "iron bath" technique. Hydrogen fired electrolytic iron appears to be quite satisfactory for the bath material. This method has the disadvantages of requiring crucible replacement at a more frequent interval than the "dry" technique. However, results have been significantly more satisfactory.

Water Quality Laboratory

Ion exchange columns were set up in the water laboratory in order that water samples may be prepared for quantitative spectrographic analysis for such ions as iron, nickel, chromium, and zirconium, in the range of 5 ppb. Data is being gathered to compare with the normal colorimetric procedures where applicable.

Work volume statistics for the Analytical Laboratories Unit are as follows:

	JULY		AUGUST	
	No. of Samples	No. of Determinations	No. of Samples	No. of Determinations
<u>Research & Development</u>				
<u>Pile Technology</u>				
Metallurgy Research	101	302	72	207
Pile Materials	197	1135	171	808
Fuel Technology	47	633	41	228
Physics Research	1	46	0	0
<u>Separations Technology</u>				
Chemical Research	711	1332	654	1103
Chemical Development	585	1145	1256	2671
Plant Processes	41	65	53	81
<u>Process Technology</u>	90	651	196	640
<u>Other Customers</u>	76	228	73	285
Total	1849	5537	2516	6023

MONTHLY REPORT
DESIGN SECTIONVISITORS AND BUSINESS TRIPS

L. R. Gibbs of the Radio Corporation of America, Portland, Oregon visited Hanford August 8th and 9th to adjust television equipment in 100-F Area.

A. J. McConnell of General Electric Company, Schenectady, New York and C. B. Hinton of General Electric Company, Spokane, Washington visited Hanford August 9, 1955 to discuss HAPO relay study.

M. F. Parr of the Foxboro Company, San Leandro, California visited Hanford August 23rd through 25th to perform work on alterations to the power calculator.

E. R. Rudock visited the Resistoflex Corporation, Balleville, New Jersey August 2nd through 8th for inspection of flexible connectors.

A. B. Carson visited the General Electric Company, Schenectady, New York August 4th and 5th for consultation on reactor design development program.

J. L. Turner visited Panellit, Incorporated, Skokie, Illinois; Brown Instrument Company, Philadelphia, Pennsylvania; and the Foxboro Company, Boston, Massachusetts, August 11th through 21st to explain detail instrumentation design requirements for Project CG-613.

O. W. Priebe visited Gunderson Brothers, Portland, Oregon August 15, 1955 to approve vendor shop drawings.

B. R. Elder visited the Resistoflex Corporation, Balleville, New Jersey August 15th through 18th and the Weatherhead Fitting Company, Antwerp, Ohio August 19, 1955 for inspection of flexible connector fabrication.

E. B. LaVelle visited the Struthers Wells Corporation, Warren, Pennsylvania August 16th through 19th for engineering assistance on welding fabrication problem.

E. J. Barrett and R. C. Hoffman attended the AIEE Pacific General Meeting, Butte, Montana August 14th through 18th as Official Delegates.

D. S. Baker visited the Bonneville Power Administration, Portland, Oregon August 24th through 26th to provide assistance on AC Board Study.

H. D. Tibbals visited the General Electric Company, Schenectady, New York August 27th through 31st to discuss design and project administration and control methods.

J. L. Boyd visited the Fluor Corporation, Denver, Colorado August 28th and 29th to discuss design and project administration costs.

R. R. Claar visited the Pacific Car and Foundry, Seattle, Washington August 26, 1955 to review structural steel fabrication drawings for 224-UA Building.

Metallurgical Design Development

A study has been started to investigate the problem of air contamination by oxides of nitrogen and nitric acid mist in the 313 Building. Various alternates and combinations of stacks, scrubbers, washers, packed towers and electronic precipitation are being evaluated.

Work continued on the problem of converting the present 300 Area slug pickling equipment from spray processing to dip processing. Several conversion alternates are being reviewed on the basis of engineering feasibility and economic justification.

Reactor Design Development

Preliminary design criteria have been established for a new reactor plant to provide supplementary plutonium production at HAPO. The completed scope design of this reactor will provide an alternate method for obtaining the additional plutonium production capacity equivalent of the proposed pressurization program for existing reactors. The design criteria provides for a graphite moderated, pressurized water reactor using horizontal process tubes. The design is based on current reactor technology without significant extrapolation of any data in order to permit near term design and construction.

Work was started on a preliminary feasibility study for pressurization of an existing reactor. Efforts are presently being concentrated upon definition of various process limitations, the selection of an optimum process water flow rate and bulk outlet temperature, and a determination of a satisfactory means of disposal of the reactor effluent. Work is also proceeding on the evaluation of slug and tube corrosion problems, production gains and operating efficiencies. It is proposed to evaluate various degrees of plant modification from the standpoint of technical and economic feasibility.

Preliminary scope designs were prepared for two alternate methods of providing acid addition facilities for the 100-K Reactor Plants. Ultimate choice between the two proposals will be influenced by expected maintenance and operating characteristics.

Design Section personnel participated in a study of the effect at HAPO of minimum release of water from the proposed Priest Rapids Dam. Preliminary recommendations are that 36,000 cfs be established as minimum flow.

Work continued on preliminary design scope for the 100-C continuous charge-discharge facilities. The proposed design provides for procurement and testing of component parts off-pile, detailed plans and specifications for 100 tube demonstration installation and ultimate design modifications for full reactor installation.

Long range development efforts are continuing on both the controlled column and flush methods of charge-discharge. Procurement has started on equipment for testing a worm and gear driven outlet ball valve system. Study is being given to utilization of closed circuit television viewing of inlet and outlet operations. Additional studies have been made on the adaptation of the 100-K charging machine to continuous charging.

The study of engineering and economic feasibility of power recovery at 100-C continued. Two alternate proposals for power generation from 90,000 gpm reactor effluent water at proposed outlet water temperatures of 120°C have been prepared. Cost estimates for the first alternate (112,000 KW net power output) was \$32,000,000 with a pay-off period of 12 years. Capital cost for the second alternate (77,500 KW net power output) was estimated at \$20,000,000 with a pay-off period of 11 years.

DECLASSIFIED

Design Section

HW-38828 **DEL**

Work continued on the preparation of preliminary design scope for a zone temperature monitoring system for existing reactor application. A project cost estimate based on the tentative design criteria has been developed and a project proposal is in preparation. The estimated project cost is \$900,000.

Preliminary designs were completed for a proposed process tube flow monitoring facility. The two tube flow test facility, to be located in the 189-D flow laboratory, will be used to evaluate components for process tube flow instrumentation.

The program for evaluation of resistance thermal detectors in the 100-K temperature monitoring system continued. The closing date for vendor proposals for prototype detectors has been advanced to mid September.

Mechanical Development items active during August included prototype process tube removal equipment, alternate facilities for 100 Area dummy decontamination and vibration studies of 100-KE effluent lines.

Separations Design Development

A summary document, HW-37998, was issued covering the completed study for a continuous dissolving facility to supplant the present Redox Plant dissolvers. Although the proposed facility would solve many of the present Redox problems, the large capital investment (\$14,000,000) and the estimated on-stream date of July, 1960, indicates the need for considerations of further alternates for obtaining Redox dissolving capacity.

The study of Redox Phase III capacity increase continued. Emphasis was placed on the evaluation of column capacities, and data from recent plant capacity tests were factored into the study. Preliminary scope is pointed toward a capacity goal of 1-1/2 times the Phase II design rate.

The program for the development of facilities to promote circulation of liquid wastes in the underground waste storage tanks was active during August. As a result of prototype recirculator tests conducted during July, proposals were made to provide recirculators for 241-A, 241-SX and 241-SY Tank Farms. Test work showed that steam was unsatisfactory as the motivating gas for the circulators. As a result all proposed circulators are to be operated with compressed air.

An extensive evaluation of proposals for Redox temporary "back-up" iodine removal facilities was completed. The high cost of such an installation resulted in reconsideration of a long range proposal for combination acid recovery and alkaline iodine removal facilities.

Preliminary scope designs were prepared for processing off-standard TBP Plant uranium solutions through the Redox silica-gel and possibly thru the ozonization facilities. These designs would provide (1) greater assurance of production continuity, (2) higher rates of production and (3) earlier shut-down of the TBP operation. Five alternate proposals were prepared for evaluation and study.

Work is in progress on preliminary scope designs for outside back-up iodine removal facility for Purex dissolver off-gas systems. Both "short-range" and "long-range" alternates are being evaluated.

DECLASSIFIED

Design Section

HW-38828

DEL

Mechanical development studies in progress include UO_3 specific gravity recording equipment, improved process agitators, column interface monitor and in-line alpha monitor.

Chemical Processing and Reduction Program

Work has started on the fabrication of a spiral feeder-type continuous fluorination furnace. A vibrator base unit to drive the feeder has been ordered.

Preliminary design for an improved Task III cylinder ram head was completed and fabrication has started. This head is designed to minimize the heat transfer from the Task III pressure vessel to the furnace lift cylinder and thus decrease the cooling cycle time.

Scope designs for converting the Task III pickling hood from a nitric acid to a hot water operation were completed.

234-5 Design Development

Results were received from vendors selected to comment on the preliminary scope drawings for a remotely operated final shape machining lathe. The Monarch Lathe Company expressed interest in designing and fabricating such a machine.

Studies were completed for adopting a commercial lapping machine to the mating and inspection facilities in Room 242 of the 234-5 Building.

A final report recommending modifications to the RM Line conveyor system has been prepared.

Engineering Standards and Materials Development

The status of progress on standards during August is as follows:

- a. Standards completed during the month included:
 - HWS-8061-S, Standard Specification for Austenitic Stainless Steel Plate, Sheet and Strip
 - HWS-8062-S, Standard Specification for Austenitic Stainless Steel Bars and Structural Shapes
 - HWS-8063-S, Standard Specification for Stainless Steel Castings
 - HWS-8064-S, Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipe
- b. The preparation of a standard specification for stainless steel tubing advanced to 70% complete. In addition, a specification for stainless steel fittings was started. This work is 25% complete.
- c. Work is progressing on standard drawings for Five-Fold Hand and Foot Counters. This work, which includes the preparation of 24 drawings, is 65% complete.
- d. Work continued on a standard specification for austenitic stainless steel welding electrodes and filler rod. This specification is 80% complete.

DESIGN PROJECTSStatistics

Engineering and drafting effort of the Section on project activity for the month of 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>
4-X Program	17.2	19.8	12.1	17.4
Reactor Plant Modification for Increased Production	15.6	18.0	8.7	12.5
100-K Reactor Plants	11.7	13.5	2.3	3.3
Purex Modifications	6.2	7.1	7.2	10.3
Other Design Projects	13.2	15.2	13.9	20.0
Customer Work and Miscellaneous	22.9	26.4	25.4	36.5
	<u>86.8</u>	<u>100.0</u>	<u>69.6</u>	<u>100.0</u>

CA-512 - 100-K Area Facilities

Work continued on the preparation of construction as-built drawings and the processing of minor design revisions. The as-built program is 95.4% complete. A total of 1954 drawings have been completed and the remaining 201 drawings are in various stages of completion.

Design was completed during the month on modification of the temperature monitor instrument tunnel and installation of air conditioning equipment for dust proofing the tunnel.

Design assistance was furnished on a three shift basis during the electrical emergency at 165-KW Building. Investigation was made of the operability and adequacy of alternate power supply and switching arrangements. Work is in progress on recommendations for increasing the reliability of the power and water systems of the 100-K Areas both from a temporary and long range standpoint.

Construction drawings and acceptance test procedures are being revised to permit a lump sum contractor to do the major portion of the construction work within the 1706-KER Building.

CA-513 - Purex Separations Facility

Authorization was received during the month from HOO-AEC for CA-513-E, Expansion of 200 Area Facilities. Proposed expansion items specifically excluded from this authorization included silica-gel facilities, back-up iodine removal facilities and a second remote crane. Project proposals requesting separate authorization for these items are being prepared.

Detailed plans and specifications were started during the latter part of the month for (1) Iodine Monitoring Facilities, (2) Continuous Sampling Facilities and (3) Waste Storage Tank Circulation Facilities. Requisitions were prepared for advance procurement of critical material.

Design assistance was furnished in the field to resolve problems encountered during pre-start-up testing of the Purex Plant.

Detailed design for the Purex Disposal Tunnel was completed during August.

CA-514 - 300 Area Expansion**DECLASSIFIED**

Design modifications are in progress for the cap and can cleaning equipment to comply with the fire code for a hazardous area. Other problems which remain to be worked out include concentrated nitric acid fumes around the etch and pickle machines, excessive noise at the facing lathe, malfunctioning of the radiographic trays and the addition of a caustic waste station.

CA-539 - Additional Waste Storage Facilities - Redox

Additional design work to provide for waste tank recirculation facilities is in progress and is scheduled for completion early in September.

CA-546 - Fuel Element Pilot Plant

Total design completion status for the project is 94%. The development equipment detailed design has been completed and the equipment installation design is complete with the exception of the acceptance test procedures.

CG-558 - Reactor Plant Modifications for Increased Production

Total design advanced to 91% complete, an increase of 3% during August. Scope design is complete and detailed design is 89% complete. A total of 77 construction drawings were completed and approved during the month. Major effort for August included the preparation of a bid package for lump sum construction of the 190-F and H Buildings in addition to the review and approval of vendor drawings.

Authorization was received from HOO-AEC for the design field liaison portion of Phase II design (F and H Areas). Detailed design for these areas was previously authorized under Phase I of the project.

CG-578 - Effluent Water Monitoring Improvements, 100-B, D, DR, F and H Areas

Detailed design for this project was completed during June. Design activity for August was limited to assistance during installation of the Gamma system in 105-H and during start-up.

CG-579 - Effluent Water Monitoring Improvement, 100-C Area

Detailed design for the Gamma monitoring system for the 100-C reactor was completed during July. Design effort during the month included design field liaison in support of equipment installation.

CG-586 - First Capacity Increase - 230 KV System

Detailed design advanced 27% during the month and currently is 95% complete and on schedule. All construction drawings and specifications required for the lump sum contract portion of the project have been forwarded to HOO-AEC.

CG-598 - Purex Vacuum Fractionator

General Electric detailed design for the project reached completion during the month. Requisition for engineered equipment is approximately 95% complete.

CG-600 - Hanford 4-X Program, 100 Areas

Design completion status is 96% , an increase of 2% during August. Completion of remaining detailed design is contingent upon the approval of the revised project proposal submitted to HOO-AEC.

CG-603 - Hanford 4-X Program - Bismuth Phosphate Plants

Detailed design advanced to 99% complete. Five drawings remained to be completed, three for the F-10 facility and two for miscellaneous details.

CG-612 - Alterations of 713 Building for Electronic Data Processing Machine

Design assistance furnished in support of equipment installation and testing was completed during the month.

CG-613 - Hanford 4-X Program - Metal Conversion Plant

Detailed design for the UO_3 Plant Expansion advanced to 98% complete. The design scope is currently being revised to provide for a new maintenance facility (Phase IV) to replace the existing maintenance hutment. The inclusion of Phase IV in the project will require a revision to the present design schedule.

All detailed design for Phases I, II and III have been completed with the exception of the acid addition system and the 224-U bulk handling facilities.

Considerable engineering time was devoted to the off-site review and approval of vendor drawings in order to expedite critical material procurement.

CG-614 - Hanford 4-X Program - 300 Area

Detailed design for this project was completed during August.

CG-616 - Installation of Acid Feed Equipment, 100-B, C, D, DR, F and H Areas

Detailed design advanced to 25% complete during the month. A design schedule was submitted to HOO-AEC establishing a design completion date of December 12, 1955.

CG-621 - Redox Contamination Control Facilities

A revised design schedule was submitted to HOO-AEC during August. This schedule which included design for the total project established a design completion date of March 23, 1956. Detailed design status for the various phases of the project is as follows:

E Cell Ozonization, Phase I	100%
J-6 Pre-condenser	10%
Pre-cycle Jumpers	100%
Canyon Washdown Facilities	5%
E Cell Ozonization, Phase II	Not Started
Disposal of Contaminated Equipment	Not Started

The project scope is currently being revised to provide for a large E-13 concentrator.

CG-624 - Redox Railroad Tunnel Ventilation Barrier

Detailed design progressed to 91% complete.

CG-625 - Additional Waste Disposal Facilities - 200 Areas

Design for Phase I, which includes an eight tank farm addition to the existing 241-SX Tank Farm remained at 96% complete. Final approval of plans and specifications has been withheld pending possible scope revisions to the project.

CG-626 - Alterations to Redox Inert Gas System

Detailed design advanced to 83% complete, an increase of 38% during August. Thirteen drawings were approved and two drawings issued for comment during the month. A total of 32 drawings are required for the project design.

CG-631 - Crib Replacement Facilities - 241-T Tank Farm

The preparation of plans and specifications has been halted pending a decision of the necessity for the facility.

D. O. 100757 - As-Built Area Maps

Drafting work on this project was limited during the month because of higher priority work. As of the end of August, 348 of 358 required drawings had been completed.

D. O. 100963 - Floor Loading Stress Survey - 326 Building

The design survey is approximately 70% complete.

D. O. 101218 - General Improvements to the Laboratory Buildings (CG-576)

The scope of the project has been modified to include additional electrical design. Detail design status is 98% complete.

D. O. 101283 - Building 327 - Cell for Tensile Testing Machine (CG-576)

The shop drawings for the shielding were reviewed and approved. Design of the shielding foundation has been started. Design is approximately 93% complete.

D. O. 101287 - Redox Stack Particulate Sampler - Project Proposal (CG-635)

A project proposal requesting \$50,000 for design and installation of an improved particulate sampler for the Redox ventilation stack was submitted to HOO-AEC early in August. A directive was issued by HOO-AEC on August 29, 1955 authorizing design and construction for the project.

D. O. 101294 - Metal Preparation - 306 Building

Specifications have been prepared for purchase of a high temperature outgassing furnace. Design is 90% complete.

D. O. 101310 - Additional Generating Capacity - 189-D Building - As-Built

Four drawings and two BPF's were revised to bring the project to as-built status. Design is complete.

D. O. 101365 - Recuplex As-built Drawings

Eight drawings have been revised to as-built condition and approved. The program is 90% complete.

D. O. 101373 - Yakima River Pumping Facility

Design is 80% complete. Specifications and structural drawings have been issued for comment. Revision of the electrical drawings for comment is scheduled for early September.

D. O. 101378 - TBP Plant - Augmented Intercycle Stripping

A project proposal requesting \$203,000 for the conversion of Section 9, 221-U Building to an intercycle concentration section was completed during July and submitted to Management. Approval had not been obtained as of August 30, 1955.

D. O. 101380 - Shielded Personnel Monitoring Station

A project proposal draft was completed and forwarded to the customer for comment during the month. The total estimated project cost is \$140,000.

D. O. 101399 - Modifications to Industrial Medical Facilities - Kadlec Hospital

A project proposal draft was completed for modifications to the industrial medical facilities at Kadlec Hospital and was forwarded to the customer for review and comment. The total estimated project cost is \$100,000.

D. O. 101400 - Intercommunication System for 189-D Building

The design for two intercommunication systems to serve three heat transfer laboratories in the 189-D Building advanced 20% during August to completion.

D. O. A-00100 - Additional Cooling Water Crib Facilities for Redox - Project Proposal

The draft of the project proposal was completed during August and issued to the Manufacturing Department for review and comment. The total estimated project cost is \$230,000. Approval of this proposal is being held up pending further study of use of cooling towers for a portion of the Redox cooling water.

D. O. A-00101 - Redox Capacity Increase, Phase III - Project Proposal

The project proposal for Redox Capacity Increase, Phase III was prepared and issued to Management for review.

D. O. A-00107 - Crud Test Heating Sections

The mechanical design for this job was completed and issued for comment. It is presently planned to use existing electrical equipment.

D. O. B-99316 - Charge-Discharge Equipment, 105-C - Project Proposal

A project proposal for design of full-scale continuous charge-discharge equipment for C Reactor and for design of a demonstration unit of approximately 100 tubes was prepared and issued to Management for approval.

D. O. C-91541 - Tube Removal Development - 100 Areas

An engineering feasibility study was initiated during August to investigate equipment for more efficient means of process tube removal from reactors.

D. O. C-98574 - 300 Area - Engineering Study of Construction Budget Item

The preliminary design for modification of the 327 Building has been started.

Design Work Completed During August

D. O. 101239	Redox Plant - Liner Box for Canyon - Detail Design
D. O. 101241	Disposal Facility for Failed Equipment
D. O. 101288	TBP Plant - Project Proposal for Wind Tunnel
D. O. 101325	Redox Plant - Scope Design for Additional Service Areas
D. O. 101331	Redox Plant - Additional Service Facilities - Project Proposal
D. O. 101336	Glove Boxes for Retaining Animals
D. O. 101359	Z Plant - Design Services
D. O. 101386	250-KV X-Ray Equipment - Project Proposal
D. O. 101387	Z Plant - Drafting for Piping Revision
D. O. 101401	Process Tube Mock-Up Shielding Door
D. O. 101405	Animal Farm, 141-H Building Ventilation Study
D. O. 101406	Animal Farm, 141-M Building, Heating & Ventilation Study
D. O. 101407	Structural Load Analysis - 305 Building
D. O. C-86316	Redox Plant - Jumper Design
D. O. C-86697	U Plant - Ventilation Jumper Design
D. O. C-96842	T Plant - Drawings for Cooling Tank
D. O. C-96858	T Plant - Connector Prints
D. O. C-98207	TBP Plant - Adaption of Pulse Generator
D. O. C-98210	U Plant - Jumper Design
D. O. C-98211	U Plant - Pipe Assembly for RA Pulser

INVENTIONS

All persons in the Design Section 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.

RH Beaton
Manager - Design
ENGINEERING DEPARTMENT

RH Beaton:HDT:md

DESIGN SECTION WORK STATUS

ENGINEERING MONTHS

PROCESS ENGINEERING SUB-SECTION

Description	Backlog Start of Mo.	Work Sch'd Dur. Mo.	Time Spent % of Dur. Mo.	Total Effort	Backlog End of Month	MONTHS					Bal. of FY 1956 & Later	Total
						Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	
Purex Modifications	22.8		2.7	3.8	20.1	3	4	4	2	2	1	20.1
CG-558 & CG-600	16.1	8.0	1.4	2.0	22.7	2	2	2	2	2	2	22.7
4-X Program	19.3	4.0	1.8	2.6	21.5	2	2	2	2	1	1	21.5
Reactor Design Dev.	277.9		33.7	47.9	244.2	30	28	28	26	25	25	244.2
Separations Design Dev.	217.8		19.5	27.7	198.3	20	20	19	19	19	19	198.3
Metallurgy Design Dev.	27.1		2.0	2.8	25.1	2	2	2	2	2	2	25.1
234-5 Design Dev.	17.6		1.1	1.6	16.5	1	1	1	1	1	1	16.5
Weapons Design Dev.	11.2		0.8	1.1	10.4	1	1	1	1	1	1	10.4
Other Proj. & Misc.	26.3	4.0	7.0	9.9	23.3	5	6	6	6	6	6	24.0***
Ant. Future Work						1	2	4	9	11	11	59.0
Totals	636.1	16.0	70.0	100.0	582.1	67	68	69	70	70	69	714.8

DESIGN ENGINEERING SUB-SECTION

Purex Modifications	70.0		2.8		67.2	4	5	6	5	5	5	67.2
CG-558 & CG-600	152.7	10.0	12.7		150.0	12	11	11	10	9	8	150.0
CG-586	9.7		2.0		7.7	1	1	1				7.7
CG-598	9.6		1.0		8.6	1	1					8.6
CG-616	18.1		1.7		16.4	2	3	3	2	1	1	16.4
CG-621	33.4		1.5		31.9	3	3	3	3	3	3	31.9
CG-624	1.7		0.7		1.0	1						1.0
CG-625	37.9		0.7		37.2	2	3	3	3	3	3	37.2
CG-626	3.7		0.4		3.3	1	1					3.3
4-x Program	41.9	10.0	12.8		39.1	12	10	8	6	2	1	39.1
Design Development	154.1		13.0		141.1	13	14	14	14	14	14	141.1
Other Maj. Minor, Misc.	134.0	10.5	26.6		117.9	21	20	19	18	17	16	60.0****
Ant. Future Work						1	3	8	13	20	23	153.0
Totals	666.8	30.5	75.9		621.4	74	75	75	74	74	74	448.5

Present total backlog is distributed over the five engineering branches in terms of man months as follows:

Authorized Work FY 1956	Anticipated Future FY 1956	Totals
Arch. & Civil 126	43	169
Mechanical 212	78	290
Electrical 94	64	158
Instrument 136	71	207
Standards 53	18	71
Totals 621**	274***	895

*Includes 1706-KER, 512, 514

**Includes Design Development

***Includes 53 man months, Other Major & Miscellaneous Work for FY 1956

I. SUMMARY

A. Organization and Personnel

Following is a summary of personnel changes in Project Section during the month:

	<u>July 31, 1955</u>	<u>August 31, 1955</u>	<u>Net Change</u>
Employees on payroll	348	351	3
Technical Graduates, Rotational	3	7	4

The end-of-month status involved these changes:

	<u>Project Section</u>	<u>Technical Graduates Rotational</u>
Payroll additions	2	
Payroll removals	6	
Transfers into Section	13	5
Transfers from Section	6	1
Transfers within Section	3	

B. Scope of Activities

At the end of the month the completion status of major construction was as follows:

<u>Project No.</u>		<u>Completion</u>	
		<u>Scheduled</u>	<u>Actual</u>
CA-512	100-K Area Facilities	100% ²	100% ¹
	1706 KER Recirculation Facilities		14%
CA-513-A	Purex Facilities, Part A	100%	100% ³
CA-539	Additional Waste Storage Facilities, Redox	76%	82% ⁴
CA-546	Fuel Element Pilot Plant	70%	70%
CG-558	Reactor Plant Modifications, Phase I	15%	22%
CG-603	Hanford 4X Program, Bismuth Phosphate Plants	77%	77%
CG-613	Hanford 4X Program, Metal Conversion Plant	²	2.5

C. Craft Labor

There were no labor disturbances sufficient to stop work.

D. Safety and Security

Nine regular meetings for discussions of safety, security, and health topics were attended by about 195 Project Section employees. Four Monday-morning tool box and three mass safety meetings were conducted in the field for labor service contractor personnel. Three Special Hazards Orientations were given to a total of 73 new and

- 1 Complete except for start-up and clean-up items.
- 2 Schedule is being prepared.
- 3 Complete except for start-up and design changes.
- 4 Does not include Revision No. 7 to the project proposal.

rehired employees. The replacement of horizontal control rods was accomplished in 105-H on August 11, 1955, and this was the fifth reactor modification without over-exposure of personnel. Project Section has completed seven consecutive months without a security violation.

E. Highlights

Project Auxiliaries Sub-Section

The workload for Estimating Unit increased to 79 on schedule, of which 37 have been completed, including twelve for project proposals. Reproduction output decreased about 11% to an average daily rate of 12,977 square feet. The Engineering Files distribution increased about 7,000 prints to a total of 148,015. On the tracing rehabilitation program, 45 linen reproductions were selected from files and processed through the reproduction shop. Field Surveys continued routine field assistance, principally on the Hanford 4X Program projects, and the Reactor Plant Modification. An accelerated schedule on the re-survey and platting of Richland was adopted in an effort to complete assistance work by October 1, 1955. Project Control activity included transmittal of eight projects to Financial Department and the AEC, issuance of eleven work authorities, and issuance of four completion notices.

Inspection Sub-Section

The number of orders requiring inspection continued to increase slightly to a total of 617, of which 550 were assigned to inspectors. A heavier workload was contained in the monetary increase of assigned orders to about \$10,900,000. Major inspection effort was directed by eight men at the Resistaflex teflon-braided connectors to be used at 100-K, and process water pumps for the Reactor Plants Modification. Additional x-ray examination of the pump castings revealed gross defects which necessitated repairs. In addition to those at the foundry, three sets were returned from the vendor's machine shop for repairs. The On-site Inspection Unit was functioning with four full inspectors. Shipments have been started of aluminum nozzles and teflon-braided connectors for 100-K reactors. Calciners for the Metal Conversion Plant are being fabricated.

Minor Construction Sub-Section

The total work assigned to Minor Construction forces represented about \$16,137,000. Newly-assigned work consisted of 18 work orders and portions of the following: CG-610, Additional Air Drying Facilities, Building 234-5; CA-627, Replacement of 300 Area Fence; and IR-196, Surfacing of White Bluffs Areas. The completed work included CG-608, Redox Crane Viewing Room, and 21 work orders. Average manpower for the labor service contractor was about 1,125. As represented by assigned manpower, the major projects in progress were Reactor Plant Modifications, Hanford 4X - Bismuth Phosphate Plants, Redox Tank Farm, Purex, and completion of work orders in 300 Area. Plans were completed to use 2101 Building for storage of engineered material and equipment to be used for the Reactor Plant Modifications. Large motors and gears are being moved in.

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Project Engineering Sub-Section

Work was done on 41 projects, four informal requests, and miscellaneous engineering requests. The Sub-Section completed work on projects for Central Mask Washing Station, the Redox Crane Viewing Room, and the 713 Building Alteration; the informal request for Classified Scrap Disposal, 300 Area; and two engineering requests. New work was accepted for CG-634, Replacement of Redox 216-S-1 and two cribs, IR-198, Redox Stack Spray Piping Modification, and ten engineering requests. Six contracts are being administered according to assigned responsibility from AEC. On Phase I of the Reactor Modification Program, replacement of horizontal control rods was completed in 105-H. Other important projects now in progress are 100-K Area Facilities, Redox Waste Storage, Fuel Element Pilot Plant, First Capacity Increase - 230-KV System, Effluent Water Monitoring, and Hanford 4X Programs.

Separations Projects Sub-Section

The essential completion of ventilation balancing and area paving almost closed out work on Part A of Purex Facilities. Considerable advance work was done toward Part "E", the 2.75 factor capacity increase; and the work which was intermingled with Part "A" in 202-A Building was essentially completed. Under a special authorization, engineering work was started on extensions for Columns HA and IA. Reworking of 34 canyon jumpers was finished, and the jumpers returned to the canyon. Tie-ins for iodine back-up facilities were started. The lump sum contracts for Cribs A-9 and A-10 have been awarded. For the Purex acid fractionator project, a cost-to-complete estimate is being prepared. The supply order with Lummus Company for the acid fractionator and associated equipment was modified to a value of \$226,799.

F. Monthly Report of Inventions and Discoveries

All persons in Project Section 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.

J. C. McMahon, Manager, Projects

II. STATISTICAL AND GENERAL

A. Significant Assignments

1. Initial Reporting

CG-634, Replacement of Redox 216-S-1 and 2 Crib

The project proposal requested \$95,000 was transmitted to the Commission on July 6, 1955. Work is to be authorized from 1956 funds.

IR-198, Redox Stack Spray Piping Modification

An informal request for \$15,500 was approved by AEC to provide separate water feed to the upper two existing stack spray rings. Design and procurement are being initiated.

ER 490, Zone Temperature Monitoring, 105-B, C, D, DR, E, and H

The estimated physical performance schedule, including starting and completion dates after authorization, was transmitted to Design Section.

ER 2767, Additional Redox Liquid Cooling Waste Cribs

A project proposal requesting \$230,000 is being prepared by Design Section.

ER 2768, Sludge Disposal Facilities, 221-T 2nd Cycle, 241-T Farm

The project proposal was being prepared by Design Section, and the work is being cancelled by Manufacturing Department.

ER 2769, TBP Product Tail-end Treatment Facilities

The project proposal is being prepared by Design Section. Supporting information for the proposal is being gathered during final scoping work by Design Section.

ER 3124, Graphite Machining Facilities, 300 Area

On the basis of a request from Engineering Department, Separations Technology Section, a project proposal is being prepared to request establishing of a cold graphite machine shop in the 300 Area.

ER 3125, Roof Repairs, Central Stores

The Design Section has been requested to prepare recommendations and specifications for repairing the roof at Central Stores. On the basis of this outline, preliminary cost estimates are being prepared.

ER 3126, Replacement, Repair and/or Removal of Valve Houses, 100-B, D, and F Areas

At the request of Manufacturing Department, Reactor Section, a project proposal is being prepared to request repair and/or replacement of valve houses in the 100-B, D, and F Areas.

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ER 3127, Painting of Two High Tanks at 105-C Area

Specifications are being prepared for performance of this work by a fixed-price contractor. A cost estimate which amounted to \$9,000 was prepared, and the information was submitted to Manufacturing Department on August 22, 1955. The work is to be performed on a work order by Manufacturing Department.

ER 3128, Decontamination Facilities, 100-H, 200-W, and 300 Areas

The Industrial Medical Sub-Section is preparing the justification for a project proposal.

ER 3129, Modifications to Industrial Medical Facilities, Kadlec Hospital

The information required for a project proposal was forwarded to Design Section.

2. Final Reporting

CA-596, Central Mask Washing Station, Building 2723-W

Construction progressed 42% to completion. The project was closed out with exceptions, and remaining work is to be completed on work orders to Minor Construction and plant forces. Information for the physical completion notice is being assembled.

CG-608, Redox Crane Viewing Room

Construction progressed 10% to completion, and the project was accepted as of August 9, 1955. Information for the physical completion notice is being assembled.

CA-612, Alteration of 713 Building for Electronic Data Processing Machine

The only remaining work is being accomplished by plant forces on a work order basis. Information for the physical completion notice is being assembled.

IR-183, Classified Scrap Disposal, 300 Area

Field work was completed with the exception of access roadway. A work order is being written to Minor Construction for completion of the work. Information for the physical completion notice is being assembled.

ER 2768, Sludge Disposal Facilities, 221-T 2nd Cycle, 241-T Farm

At the request of Manufacturing Department this work is being cancelled.

3. Current Projects

CA-512, 100-K Reactor Facilities

The revised project proposal was forwarded to AEC on August 23, 1955. This proposal requests additional funds of \$2,000,000 for completion of 25 engineering improvements and changes which are believed necessary for satisfactory completion of the project. A work authority dated August 18, 1955, authorized General Electric \$60,000 to modify and repair 48 existing backwash valves in the 183.3 KE and KW Buildings.

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Clean-up on minor items of work was continued satisfactorily by Minor Construction and plant maintenance forces. Planning of procedures and tooling for replacement of front face connectors were in progress. A target date of October 3, 1955, was set for installation of the connectors. Accomplishment of the work depends upon delivery of reactor components. Of the 7,000 connectors required, 600 were shipped on August 30. The vendor for 14,000 adapters has been authorized premium payments in the amount of \$3,500 in order to deliver by September 23. Shipment of aluminum nozzles has been started, and the delivery schedule appears to be firm. Twenty new aluminum process tubes with double-thickness walls have been received. Four tubes are to be installed in each 100-K reactor during the connector replacement program.

CA-512, 1706 KER Recirculation Facilities

As previously decided the method of work performance was to be changed on August 12, 1955. With overall construction about 14% complete, Minor Construction forces moved out of the 1706 KER facility to allow completion by a fixed-price contractor. Drawings and Acceptance Test Procedures are being revised to permit a lump sum contractor to complete work in the 1706-KER Building. All construction equipment was removed from the site. Material was inventoried and returned to Stores Sub-Section or warehoused for issue to the successful bidder. Requisitions for items which the future contractor can supply are being cancelled, and a Material and Equipment List is being prepared for inclusion in a bid package.

CA-513-A, Purex Facility

The completion of ventilation balancing by the contractor essentially completed the Purex Facility as originally designed. Current work consisted of preparation for Part "E" which was authorized during the month. The AEC Directive issued on August 11, 1955, provided \$1,500,000 for additions to and modifications of the Purex plant to secure increased capacity and improved operating efficiency. Of this amount General Electric was authorized \$1,212,000 for design, field engineering, some procurement, and direction of forces of the labor services contractor. This amount was later changed to \$1,412,000 to allow for extension of the HA and IA columns in Purex.

All work in 202-A Building necessary to accomplishment of Part "E" has been essentially completed. Modification of 34 canyon jumpers was completed, and the tie-in for iodine back-up facilities was started. The lump sum contracts for Crib A-9 and A-10 have been issued.

Work on the Waste Crib 216-A-8 was on schedule at 81% complete. The concrete control structure has been placed except for the top. The inlet pipe from the tank farm to the control structure is being installed. Work on the Disposal Facility for Failed Equipment was 14% complete compared with 18% scheduled completion.

CA-539, Additional Waste Storage Facilities for Redox

Design had been completed previously; construction was revised downward to 82% on the basis of a major scope change. Revision No. 7 to the project proposal was approved by General Electric representatives and forwarded to the AEC.

Minor Construction has completed the eight-inch raw water line to a tie-in to the main. The contractor has essentially completed the condenser facility, except for installation of two rotameters and a recorder which have not been delivered. Minor

Construction continued work on the valve manifold jumpers of the emergency water facility. Revision No. 7 was transmitted to the AEC. This revision requests an increase of authorized funds from \$3,622,000 to \$3,897,000 for installation of liquid circulators, liquid measuring devices, temperature instrumentation, and vapor manifold stubs.

Delivery of special valves for the manifold jumpers has been delayed because of rejected castings. This delay extends the date for jumper installation from September 30 to October 15, 1955.

CA-546, Fuel Element Pilot Plant

Design progressed 11% to a total of 89%; construction progressed 13% to a total of 80%.

Work by the fixed-price contractor has been delayed by lack of proper clearance for craftsmen to enter the 306 Building for structural work. Minor Construction forces have completed relocation of equipment to the 306 Building except for that to be installed in the plating room.

Design of the second floor offices progressed to 63% complete, and specifications were about 70% complete.

CG-558, Reactor Plant Modification for Increased Production, Phase I

Design progressed 3% to a total of 89%; construction progressed 11% to a total of 22%.

Replacement of horizontal control rods in 105-H was completed on August 11, 1955, and this completed the horizontal rod portion of Phase I. The Panellit gauge replacement was completed at 105-H during the same shutdown, and work on the poison columns is to be completed during normal operational shutdowns. Work in the other 100 Areas progressed satisfactorily on excavation, placing forms and concrete, installing pipe and tie-ins, placing electrical equipment, and making service connections. Concrete placement included walls, pump bases, tunnel slabs, and other miscellaneous items. Erection of structural steel at 183-DR Building was complete August 16, and steel erection was in progress at 190-B Annex. Preparatory work was being done for installing motors, pump drives, and process water pumps. The No. 2 motor at 181-D is being re-worked because of excessive vibration. The vendor's representative arrived on site on August 23, and consideration is being given to removing the motor for additional work.

Fabrication of the process water pumps has continued as a major problem, and a firm delivery schedule cannot yet be established. Inspection at the foundry revealed questionable areas which required additional x-ray examination. This examination revealed gross defects which necessitated repairs of five sets of casings. Three of these sets were returned from the vendor to the foundry; so this leaves one set of casings in the process of being machined.

CG-558, Reactor Plant Modification for Increased Production, Phase II

Design and construction schedules have not been completed. Detailed design for F and H Areas is being done under Phase I authorization.

A project proposal requesting \$11,200,000 was approved by AEC August 11, 1955; and a letter of August 17, 1955, confirmed the understanding that \$4,500,000 was to be obligated to cover General Electric's portion of the work as follows: (1) design, field liaison, and design services in the field; (2) procurement; (3) physical performance of the work to provide water flow of 71,000 gpm to the 100-F and H reactors. Procurement action was continued. Construction work consisting of site preparation at 190-F Building was started on August 25, 1955.

CG-603, Hanford 4X Program, Bismuth Phosphate Plants

Design progressed 1% to a total of 99%; construction of Phase I work was revised downward to 77% in accordance with the revised schedule. Some additional design was required to improve the wet and dry bulb temperature instrumentation in the 291-B Building.

The silver nitrate reactor towers, filters, and agitators were received on the plant site. Minor Construction has completed its work of insulating and packing the towers and has started mock-up of the agitators. Good progress was made on clean-up work, repair, regasketing, and run-in of equipment. Acceptance tests in 224 Building were started and continued to completion. Testing of jumpers is being done in conjunction with equipment installation. Work was directed toward completion in early September 1955 of the first cycle scavenging at 241-C Tank Farm, the waste scavenging at 241-T Tank Farm, and the fixed-price portion of the cross-country line. The major work remaining includes installation of the silver nitrate reactors, agitators, cooling coils, and crane periscope. The left-hand periscope machine is being installed.

CG-613, Hanford 4X Program, Metal Conversion Plant

Design progressed 12% to a total of 98%; construction progressed 1 $\frac{1}{2}$ % to a total of 2 $\frac{1}{2}$ %. The contractor for building foundations was scheduled to finish in early September 1955, and the steel fabricator was prepared to start field work. An interim authorization of \$145,000 was issued to Minor Construction for initiating work on 224-U Building during September.

Detailed attention was given to procurement of materials and equipment which will be a big factor in meeting the beneficial use date of May 1, 1956. About sixty orders are being placed, including those for the purge tank, stainless steel pipe, instrument panels, and control valves. All stainless steel plates for calciners have been corrosion tested and shipped to the vendor, and a prototype calciner is being fabricated. A welding instructor from HAPO was sent to the vendor's plant to clarify welding procedures and assist with qualification of welders. Expediting efforts have been applied to essential components.

The bid package for Phase III, 224-JA Building, is being prepared for issue in early September 1955. The bid opening was scheduled for October 4 and the contract award for October 7, 1955.

B. Other Assignments

CA-548, Reactivated Project Proposal for New VSR Test Tower

With scoping completed the project proposal was approved by the local AEC Review Board and forwarded to Washington, D. C., for authorization.

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CA-555, Graphite Hot Shop and Storage Building

Design had been completed previously; construction progressed 24% to a total of 26%. The notice to proceed was sent to the contractor on August 4, 1955. Decontamination and demolition were completed on August 12; work was started on August 17; and excavation for the footings was started on August 22, 1955. A letter revision to the project proposal is being prepared to request additional cold shop facilities similar to those deleted by Revision No. 2. About \$8,000 will be available from AEC funds for this purpose.

CG-572, Particle Problem Animal Exposure Equipment

Design had been completed previously; construction progressed 25% to a total of 75%. A cost-to-complete estimate was prepared, and a new work release authorized \$9,000 additional funds to Minor Construction. Architectural and structural alterations to the 141-F Building are 80% complete; mechanical work was 60% complete; electrical work was 50% complete; and installation of the laboratory furniture was 30% complete.

CG-576, General Improvement to Laboratory Area, 300 Area

Design progressed 10% to a total of 95%; construction progressed 7% to a total of 79%. Plant forces are engaged in the following work: alterations to the cell exhaust system in 327 Building, painting shop equipment in 328 Building, extensions to the fire alarm system in 329 Building, installation of doors in 325 Building, and alterations to Room 30-C in 326 Building. Minor Construction work was completed on the acoustical ceiling for the grinding room in 328 Building. Other work was temporarily suspended to await receipt of hardware, partitions, and doors. The fixed-price contractor is grading and applying asphalt paving to the 329 Building parking area.

CG-578, Effluent Water Monitoring Improvements, 100-B, D, F, DR, and H Areas

Design had been completed previously; construction progressed 11% to a total of 33%. The installation of equipment in 105-H Building was essentially completed. Final preparations are being completed for the 105-DR shutdown; and the spectrometers are being given final instrument checks. Rotameter racks, shielded drains, and tubing runs are being fabricated and installed in 105-D.

CG-579, Effluent Water Monitoring Improvements, 100-C Area

Detailed design and design services in the field are being managed by Design Section. Work was delayed for performance of similar work in other reactor areas.

CA-586, First Capacity Increase, 230-KV System

Design progressed 25% to a total of 90%. All drawings and specifications required for a fixed-price contract were completed on August 26, 1955. Review of construction specifications for installation of the four miles of 230-KV line, switching station, and switch structures was completed.

The major effort is now concentrated on procurement, and orders for engineered equipment now total about \$212,000. The following items have been received and stored at White Bluffs: power circuit breaker, 230-KV switches, structural steel, line insulators, and miscellaneous hardware. The cable tray for 165-KE-KW is scheduled for delivery.

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CG-587, TBP Waste Scavenging

Design had been completed previously; construction was revised downward to 87% completed on the basis of installing facilities for adding a third chemical to the scavenging process. All mechanical and instrument requisitions have been issued and are out for bid. A work order was issued to plant forces for fabrication of the make-up tank, and fabrication work was started during late August 1955.

CG-589, De Jacketing and Ultrasonic Equipment, 105-C Building

With construction about 50% complete, testing work was continued on the ultrasonic equipment. Piping installation, tie-ins, and back-filling were continued until August 26, 1955, when a stop charge notice was issued. The project is being re-estimated to determine the additional funds required to completion.

CA-590, Fly Ash Collection Equipment, Building 384

With preliminary design completed, the project proposal is awaiting consideration by the AEC Project Review Board.

CG-598, Purex Acid Fractionator

Design progressed 1% to completion; construction progressed about 22% to a total of 27%.

A detailed cost-to-complete estimate is being made. Phase I work was 80% complete with only a small amount of pipe work and about half of the electrical and instrumentation work remaining. Phase II was about 23% complete. Concrete has been placed up to and including the floor slab at elevation 708 feet, six inches. Imbedded piping has been installed in the building, and backfill has been placed up to the basement floor level.

CG-599, Hanford 4X Program, 100 Areas

Scoping and design are being managed by Design Section. The final draft of the project proposal is being routed for approvals within General Electric Company.

CG-600, 100-C Alterations

With construction about 3% complete, the revised project proposal was transmitted to AEC on August 8, 1955. Construction is expected to be resumed in November 1955, and a new schedule is to be submitted following authorization of the revised project proposal.

CA-601, 300 Area General Improvement Program

With preliminary design completed, the project proposal is still awaiting authorization by AEC.

CG-610, Replacement of 313 Building Roof

Design had been completed previously; construction progressed 52% to a total of 95%. Construction work was progressing well ahead of schedule.

CG-611, Mobile Laboratory

With preliminary design completed, the project proposal is being held by Radio-logical Sciences Department.

CG-614, Hanford 4X Program, 300 Area

Scope and design are being managed by Design Section. A request for re-estimate was submitted. The estimate is to include all work except modifications to 3707-D Change House. Specifications are being prepared for a fixed-price contractor to make these alterations.

CA-615, Mechanical Maintenance Shop Centralization, 100 Areas

The project proposal which was returned to AEC on July 18, 1955, is still awaiting authorization.

CG-616, Installation of Acid Feed Equipment, 100-B, C, D, DR, F, and H Areas

The design schedule as submitted to AEC establishes a completion date of December 12, 1955. Drawings are being prepared for a lump sum construction contract, and comments have been made on the first issue of final design.

CG-617, Additional Air-drying Facilities, Building 234-5

Construction work began and progressed to about 40% complete. The air dryer and water chiller, major components of this facility, were installed. The remaining work consists of installing service lines and duct work for connections with the building hood air supply system.

CA-619, Alterations to 186-D Building

A review of alterations required has indicated a cost of less than \$20,000; so the work is to be accomplished on a work order.

CG-620, Melt Plant Modifications, 314 Building

With detailed design about 70% complete, work was stopped on July 26, 1955. The Pile Technology Section is preparing a request for change of scope.

CG-621, Redox Contamination Control Facilities

Design had been completed previously; construction progressed 3% to a total of 26%. A revised design schedule for the entire project was submitted to the AEC on August 24, 1955. This schedule includes a completion date of March 23, 1956.

Construction work was limited to the ozonization phase. It now appears that beneficial use of the authorized "E" cell ozonization equipment can be attained during a shutdown which is scheduled to begin about September 1, 1955. The instrument panels and control valves, both of which were considered limiting factors, have been shipped.

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CG-624, Redox Railroad Tunnel Ventilation Barrier

Bids are being received for the electrical switch gear and for the barrier door. Bid openings were scheduled for early September 1955.

CA-625, Additional Waste Disposal Facilities, 200 Area

With design about 46% complete, preparation of the project proposal has been delayed for a review by Manufacturing Department of the date the facilities will be needed. Further work is awaiting results of this review. The bid package for all 241-SY tanks is being prepared.

CG-626, Alterations to Redox Inert Gas Vent System

Construction was started and progressed to about 3% complete. Revisions to the nitrogen bleed piping were started by plant forces on August 22, 1955. Fabrication of jumpers was scheduled to start about September 12, 1955.

CA-627, Replacement of 300 Area Fence

Design had been completed previously; construction progressed 19% to a total of 20%. A work release was issued to Minor Construction to construct barricades and to prepare the site for work by the contractor. The work authorized by this release was started on August 22, 1955. The contractor has completed installation of the poles.

CG-630, Minor Construction Fabrication Shops Modifications

The project proposal which was transmitted to AEC on July 25, 1955, is still awaiting authorization.

CG-631, Crib Replacement Facilities, 241-T Tank Farm

At the request of Manufacturing Department, Separations Section, work was stopped on this project until necessity for the facility could be reviewed. A stop charge notice was issued August 4, 1955.

CA-633, Remodeling of Facilities, Kadlec Hospital

The project proposal was returned unapproved by AEC with the request for a comparison of estimated costs by the General Electric Company and an architect-engineer.

CG-625, Redox Stack Particulate Sampler

The AEC has authorized the project proposal with the direction that scope be reduced by \$10,000.

CG-636, Redox Service Facilities Expansion

The project proposal was forwarded to AEC for authorization.

IR-191, 321 Building Fire Protection and Staging Study

Authorization in the amount of \$19,000 was received on August 15, 1955.

IR-196, Surfacing Roads and Parking Areas, Minor Construction, White Bluffs

The contractor was scheduled to commence paving during early September 1955.

* * * * *

The following studies and Engineering Requests, involving preparatory work and scoping of future projects, were active during the month:

ER 765, Painting Water Plant Structures, 100-DR Area:

The project proposal is being routed for General Electric approvals.

ER 1219, 105-KW Laboratory

The final draft of the project proposal is being revised.

ER 1221, Modifications to 105 Transfer Areas

Responsibility for this engineering request was assigned to Separations Projects Sub-Section on August 9, 1955.

ER 1225, Continuous Charge-discharge Facility at 105-C

The project proposal requesting design funds is being routed for General Electric approvals.

ER 1227, Provide Additional Storage and Shop Space in the 105-B, D, and F Buildings

The final draft of the project proposal is being routed for comments.

ER 1229, Installation of Raw Water Cross-tie, 105-C

Preparation of the project proposal is to be resumed during September 1955.

ER 2756, FY-1955 Water Tank Replacements, 100-200 Areas

The Manufacturing Department, Separations Section, is considering deletion of the high tanks in the 200-W Area.

ER 2764, 2101 Building Conversion

A project proposal based upon reduced scope as requested by Manufacturing Department, Separations Section, is being prepared.

ER 2766, 221-U Section 9 Conversion to Intercycle Concentration

The project proposal is being routed for General Electric approvals.

ER 2767, Additional Redox Liquid Cooling Water Cribs

A project proposal is being prepared by Design Section.

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ER 3122, Replacement of Steam Plant Deaerator, 384 Building

The Manufacturing Department, Metal Preparations Section, is preparing additional justification for the project proposal.

C. Related Functions

The inspection workload increased slightly during the month, and the monetary value of orders requiring inspection increased about \$1,200,000 to a total of \$10,900,000. Recent orders have been widely distributed geographically, and this has placed an additional burden on vendor inspectors. It now appears that inspection workload will increase for the next several months, and efforts are being continued to secure qualified inspectors. The on-site inspection workload has likewise increased to the degree of now requiring four fulltime inspectors.

The workload for the Corrosion Testing Program has increased to the following details: 151 Huey tests, 95 macro examinations, 14 oxalic tests, 215 chemical and physical analyses. A further increase of this workload is also expected.

The more active orders now in progress are for pigtails, adaptors, and nozzles for the 100-K Area. Considerable effort has been concentrated on the process water pumps for CG-558. This project has also required extensive x-ray examination. The calciners for the waste metals are now being fabricated, and two orders have been placed for separate concentrators for Purex.

Following is a resume of inspection activities during the month:

<u>Items</u>	<u>Number</u>	<u>Value</u>
New orders received during the month	203	
Total orders for items requiring inspection	637	
Cumulative orders assigned to inspectors	569	\$10,900,000
Orders assigned to inspectors this month	194	1,790,000
Orders completed during the month	174	625,000

Reproduction output dropped slightly to an average daily rate of 12,977 square feet. The greatest decrease was caused by reduced requests for documents and specifications. Distribution of prints by Engineering Files increased about 7,000 prints to a total of 148,000. The largest order during the month was for 18,547 prints for the Reactor Plant Modification Program.

The workload for Estimating Unit increased to 79 estimates on schedule, of which 37 had been completed. The completed estimates included the following: study, 20; project proposal, 12; construction, three; fair cost, two.

Field Surveys continued its assistance on the re-survey of Richland on an accelerated schedule. Since this program was scheduled for completion by October 1, 1955, some overtime has been authorized. The Unit also continued its routine field assistance throughout the areas.

The Project Control activity included transmittal of eight project proposals to Financial Department and the AEC, issuance of eleven work authorities, and review of all current project proposals. Nine projects were authorized during the month and five

projects were completed. Property evaluation work was continued on the 300 Area Expansion Program.

D. Craft Labor

See Summary above.

III. REPORT OF VISITORS

A. To Hanford, August 1955

Albert McDonald, General Electric Company Foundry, Spokane, Washington, visited W. C. Royce on August 2 to 5 to discuss installation of pump drives in 190 Building Annexes.

B. To Other Installations, August 1955

E. W. Powell visited AEC installations at Aiken, South Carolina, and Oak Ridge, Tennessee, on August 8 to 14 to inspect heavy duty equipment.

J. Durbin visited a Haloid Reproduction Methods Exhibit at Seattle, Washington, on August 10 to 12 to review methods of reproduction.

H. H. Hubble visited the De Laval Company, Trenton, New Jersey, and the Everett Foundry, Everett, Massachusetts, on August 8 to 10 for engineering discussions on process water pumps for CG-558.

H. Radow visited Struthers Wells Corporation, Warren, Pennsylvania, and General Electric Company, Schenectady, New York, on August 13 to 19, to discuss the calciners contract for Project CG-613.

D. W. McKee visited Gunderson Brothers, Portland, Oregon, on August 14 and 15 to discuss shop drawings of equipment for Project CG-618.

W. L. Gallagher visited Pacific Car and Foundry, Seattle, Washington, on August 26 to review structural steel details for the 224-UA Building.

R. M. Griffith visited Fruit Packers Supply, Yakima, Washington, on August 30 to discuss Purchase Order HWC-3683.

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HW-38828

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ADVANCE ENGINEERING SECTION

MONTHLY REPORT

AUGUST 1955

At present power levels, of the order of ten additional large units of products per year could be produced at very low cost by using "zero value" cascade depleted uranium, rather than non-productive "poisons," in central flattening columns.

J. W. Albright

Acting Manager, Advance Engineering
ENGINEERING DEPARTMENT

EMPLOYEE AND PUBLIC RELATIONS DEPARTMENT

MONTHLY REPORT SUMMARY -AUGUST, 1955

PERSONNEL PRACTICES SECTION

Booz, Allen and Hamilton representatives completed depth interviews and preliminary review of appraisals with management. Appraisals of the 66 people included in this group should be completed by September 15. Reports on the remainder of the group will be completed by HAPO representatives at a later date working in conjunction with BAH representatives.

Approval has been received from the Atomic Energy Commission to proceed with organization of a plan to install vending machines at HAPO.

All information necessary to conduct the "Let's Talk It Over" program, which will be held in conjunction with the non-exempt rating of General Electric employees, has been forwarded to all members of supervision.

The number of applicants interviewed in August was 1677 as compared with 1395 for July. In addition, 85 new applicants applied by mail. Open, non-exempt, non-technical requisitions increased from 194 at the beginning of the month to 208 at month end. One hundred and fifteen employees were added to the roll and 111 removed during the month. Separations rate for fiscal month of August was .92% and for fiscal month of July .98%. These rates when converted to annual rates are 12.00% and 12.78% respectively. During August 79 new requests for transfer to other type work were received by Employment and 41 transfers were effected. Attendance recognition awards were distributed to 170 employees in August, including 17 who qualified for five-year awards.

Three employees died during the month of August. One hundred and thirty-six visits were made to employees confined to Kadlec Hospital, and 36 checks were delivered to employees confined at the hospital or at home. At month end, participation in the Pension Plan was 98.5%, in the Insurance Plan 99.4% and the Employee Savings and Stock Bonus Plan 52.9%. At the month end there were 607 non-veterans registered under Selective Service and 687 military reservists were on the roll. Since August 1, 1950, 419 employees have terminated to enter military service, of which 162 have returned, 44 have not claimed re-employment rights, leaving 225 still in military-leave status.

Ninety-seven adopted suggestions were approved for awards in August resulting in cash awards totaling \$2,500 with a total net savings of \$18,689.22.

Two hundred and four offers have been extended to BS/MS graduates for the R.T.P. and there have been 68 offers accepted to date and 132 rejections. Acceptances have been received from 15 experienced candidates yet to report; there are 8 open offers and 5 other candidates are under active consideration. A total of 16 PhD candidates have accepted offers since October 1, 1954 and 129 candidates have accepted invitations to visit HAPO during the current season.

EMPLOYEE COMMUNICATIONS & PUBLIC RELATIONS SECTION

The Press Relations Unit issued 46 releases during the month, 7 of which were especially planned for national publicity purposes and were sent to the Schenectady Press Relations Section. Eight manuscripts were approved for publication, and ten technical papers received all required approvals. Arrangements were made for 13 speeches to be delivered before public groups. Two Management NEWS Bulletins were produced and distributed to all exempt personnel during the month.

Additional pictures and information were sent to the NATIONAL GEOGRAPHIC representative who visited Richland.

Pictures with outlines of GE's and AEC's joint-entry float in the annual Atomic Frontier Days parade were sent to the GE NEWS, New York and to MONOGRAM. Praising the efforts of many civic groups, the float credited religious, military, educational and service groups with making Richland, home of Hanford Atomic Products Operation workers, a better place to live.

A visualizer-type report on Hanford's 1954 "Operation 4S" program was developed at the request of the Suggestion Plan secretary for entry in the National Association of Suggestion Systems Awards competition. The 50-page book contained examples of the entire promotion which was developed and presented to HAPO employees last year by Employee Communications.

The first local "live" telecast of the GE HANFORD SCIENCE FORUM was produced this month by Audio-Visual Communications in cooperation with television station RTVC Channel 2. This feature will be produced and telecast twice a month on a sustaining basis.

A total of 322 photographic assignments were covered for the month of August, and 11,498 prints were produced.

SALARY & WAGE ADMINISTRATION SECTION

Data were supplied to other Company components pertaining to established HAPO salary administration procedures, position descriptions, etc.

A revision of the Exempt Employee Performance Appraisal Form was completed which incorporated suggestions offered by various HAPO departments and other sources. This revised form will be sent to Department Managers for study and comment.

General adjustment appraisal lists were submitted to appropriate Department Managers for review and revision. These lists will form the basis for application of Company-wide general adjustments in salaries of exempt employees, subject to approval of the General Manager.

UNION RELATIONS SECTION

Since August 11, contract negotiations with the four HAPO bargaining units have been in progress with the Company's offer provided to the Hanford Atomic Metal Trades Council on August 29.

The charge brought against the Company in June regarding the "300 Area Working Agreement," signed by supervision and the Chemical Worker stewards, is pending settlement in the current contract negotiation meetings and, if not resolved in these discussions, the parties then could proceed to litigation.

UNION RELATIONS (Continued)

A hearing was held in Richland on June 24, 1954, by Judge Harold Seering, Arbitrator, over an issue as to whether or not construction bus drivers were entitled to isolation pay for travel to and from the area. The Arbitrator's award dated August 11, 1955, rules that "man haul" bus drivers are not entitled to receive isolation pay and that the grievance be denied.

EDUCATION & TRAINING SECTION

The Pension Board approved the "leave of absence" application for graduate study submitted last month with our recommendation for change of Company Policy. Acknowledgement of the importance of such a policy due to recruiting difficulties was given. Two similar applications were forwarded this month.

As requested earlier by the Hanford Operations Office we have reported the high rate of student participation and the corresponding reduction of actual cost below budget which were achieved during the second semester of the School of Nuclear Engineering. The budgeted cost is consistent with earlier operating costs after allowing for increases in the charges for rent and general administrative allocation.

Registration for the Fall 1955 courses is now underway and is ahead of the registration for the corresponding date in 1954 or 1953. During recent months there has been a growing interest in college-level and vocational courses, and our offerings have been expanded to help various groups of HAPO employees to increase their competence through job-related evening studies.

Following 7 new hires, 4 placements in other departments, and one intra-company transfer, the Rotational Program now includes 57 trainees.

The summer employment programs (professors, graduate students, and engineering juniors) are near an end with favorable reactions by both supervisors and the temporary employees.

Mr. Ross Shearer of the Personnel Branch, AEC, Washington, D.C., visited HAPO August 4 to discuss possibilities for training employees of other companies.

HEALTH & SAFETY SECTION

The first fatality in Operations activities occurred August 31, 1955, as a result of an explosion in the 300 Area. The 200-East Area has operated 1091 days with an exposure of 2,240,000 man hours without a disabling injury. On September 3 they became eligible for their third consecutive safety award pin.

The average daily Kadlec Hospital census increased from 47.1 to 53.0 as compared to 57.3 a year ago. The Sisters of Providence from Seattle and a group of Methodist state and national church representatives were Kadlec Hospital visitors on August 30 due to their interest in possible future operation of the hospital.

Negotiations for receiving public health services from the Bi-County Public Health Unit have stopped after decision by the Bi-County Unit to not proceed further pending disposal. The number of reported cases of communicable diseases reached the lowest level of the year, 37, and 25% of this represented streptococcal disease among military personnel in North Richland.

AUXILIARY OPERATIONS AND PLANT PROTECTION SECTION

All Richland residential telephone subscribers formerly served by the North Richland exchange have been connected to the Richland exchange.

Security violations decreased 30% from July.

New Personnel Security Questionnaires were obtained from approximately 1400 employees hired between January 1, 1950, and June 30, 1951. This is phase one of a program of periodic reinvestigations.

COMMUNITY SECTION

The domestic water consumption in the Community averaged 29,000,000 gallons per day during August which was supplied without difficulty.

Effective September 1, the AEC Housing Committee policy to accept no additional applications for house exchanges was implemented. We are unofficially advised of two further policies now under consideration by the Commission relative to the disposal of real estate in Richland, which will be reported in detail at a later date.

LLGerman/jak
8/16/55

EMPLOYEE AND PUBLIC RELATIONS

PERSONNEL PRACTICES

General

Approval was received from the Atomic Energy Commission to proceed with organization of a plan to install vending machines at HAP0.

All information necessary to conduct the "Let's Talk It Over" program, which will be held in conjunction with the nonexempt rating of General Electric employees, has been forwarded to all members of supervision.

<u>Employment</u>	<u>July, 1955</u>	<u>August, 1955</u>
Applicants interviewed	1,395	1,677

371 of the applicants interviewed during August were individuals who applied for employment with the Company for the first time. In addition, 85 applications were received through the mail.

	<u>July, 1955</u>	<u>August, 1955</u>
Open requisitions		
Exempt	3	2
Nonexempt	194	208

Of the 194 open, nonexempt, nontechnical requisitions at the beginning of the month, 145 were covered by interim commitments. Of the 208 open, nonexempt, nontechnical requisitions at month end, 166 were covered by interim commitments. During August, 101 new requisitions were received requesting the employment of 155 nonexempt, nontechnical employees.

	<u>July, 1955</u>	<u>August, 1955</u>
Employees added to the rolls	104	115
Employees removed from the rolls	<u>108</u>	<u>111</u>
TOTAL NET GAIN OR LOSS	- 4	4

Separation Rate:	Fiscal Month July, 1955	Fiscal Month August, 1955
	Male Female	Male Female
	.67% 2.42%	.61% 2.36%

Over-all Separation Rate:	Fiscal Month July, 1955	Fiscal Month August, 1955
	.98%	.92%

Employee and Public Relations

PERSONNEL PRACTICES

During August, 17 employees left voluntarily to accept other employment, 4 left for business for self, and 4 left to enter military service.

Transfer Data

Accumulative total of requests for transfer received since 1-1-55	590
Number of requests for transfer received during August	79
Number interviewed in August, including promotional transfers	89
Transfers effected in August, including promotional transfers	41
Transfers effected since 1-1-55, including promotional transfers	322
Transfers effected in August for employees being laid off	---
Number of stenographers transferred out of steno pool in August	16
Transfer requests active at month end	339

ADDITIONS TO THE ROLLS

	<u>Exempt</u>	<u>Nonexempt</u>	<u>Community Firemen</u>	<u>Total</u>
New Hires	6	90	--	96
Re-engaged	-	1	--	1
Reactivates	-	15	--	15
Transfers	<u>1</u>	<u>2</u>	<u>--</u>	<u>3</u>
TOTAL ADDITIONS	7	108	--	115

TERMINATIONS FROM THE ROLLS

	<u>Exempt</u>	<u>Nonexempt</u>	<u>Community Firemen</u>	<u>Total</u>
Actual Terminations	24	52	--	76
Removals from rolls (deactivates)	-	22	--	22
Transfers	<u>12</u>	<u>1</u>	<u>--</u>	<u>13</u>
TOTAL TERMINATIONS	36	75	--	111

GENERAL

	<u>7-1955</u>	<u>8-1955</u>
Photographs taken	163	207
Fingerprint Impressions	138	132

PERSONNEL SECURITY QUESTIONNAIRES PROCESSED

	<u>7-1955</u>	<u>8-1955</u>
General Electric Cases	125	139
Facility Cases	<u>12</u>	<u>21</u>
Total	137	160

Employee and Public Relations

PERSONNEL PRACTICES

The Supervisor, Employment and Employment Representative-Women had a conference with the new operators of the Tri-City Business College during August, to acquaint the school with problems insofar as recruitment of secretaries is concerned. The manager of the school felt that they could supply the Company with a limited number of qualified stenographic personnel during our critical period from January to June.

The Project Engineering Section of the Engineering Department will utilize the G.E. Selection Program for supervisors for the first time. This is the first component of the Engineering Department to utilize this program.

Personnel Records and Investigations

<u>INVESTIGATION STATISTICS</u>	<u>7-1955</u>	<u>8-1955</u>
Cases received during the month	140	175
Cases closed	207	362
Cases found satisfactory for employment	130	162
Cases found unsatisfactory for employment	24	46
Cases closed before investigation completed	18	30
Special investigation conducted	6	1

PERFECT ATTENDANCE RECOGNITION AWARDS

Total one-year awards to date since January 1, 1950	5332
One-year awards made in August for those qualifying in July	48
Total two-year awards to date since January 1, 1950	3021
Two-year awards made in August for those qualifying in July	27
Total three-year awards to date	1755
Three-year awards made in August for those qualifying in July	37
Total four-year awards to date	848
Four-year awards made in August for those qualifying in July	41
Total five-year awards to date	248
Five-year awards made in August for those qualifying in July	17

SERVICE RECOGNITION

Total Service Recognition Pins presented to date	5315
Five-year Service Recognition Pins presented during August to Exempt personnel	18
Five-year Service Recognition Pins presented during August to Nonexempt personnel	25
Fifteen-year Service Recognition Pins presented during August to Exempt personnel	1

During August, 16 people whose continuity of service was broken while in an inactive status were so informed by letter.

Employee and Public Relations

PERSONNEL PRACTICES

Employee Services

The following contacts were made with employees during the month:

Employee contacts made at Kadlec Hospital	136
Salary checks delivered to employees at Kadlec Hospital	31
Salary checks delivered to employees at home	5

At the end of the month, participation in the Benefit Plans was as follows as compared with last month's participation:

	JULY	AUGUST
Pension Plan	98.5%	98.5%
Insurance Plan	99.4%	99.4%
Savings & Stock Bonus Plan	52%	52.9%
*Good Neighbor Fund		70.3%

Three employees expired during the month of August, namely:

R. B. McCord	8/31	M720-6373	Manufacturing
Willie D. Zetty	8/29	M7275-4701	Employee & Public Relations (On lack of work status as of 6/30/55)
Cecil M. Hoxie	8/6	W6560-5431	Manufacturing

Two retired employees expired during the month of August, namely:

George A. Ledger	8/22/55	Normal Retirement
Walter G. Albertson	3/7/55	" (notified by Payroll on 8/18/55)

All necessary arrangements have been made to settle all matters of business in connection with the named deceased employees at an early date. A member of this Unit visited the wife of our Mr. McCord on the day of his death.

Four employees retired during the month of August:

Peter E. Odman	W 8542	Normal Retirement
Louis A. Ryno	W 11307	"
Fred Schafer	W 9432	"
Charley W. Funk	M 682	"

All matters pertinent to retirement have been discussed with these employees in order that they will be fully informed of their retirement benefits.

A total of 102 new employees attended Orientation Programs given by members of this group during the month of August. 100% have signed up to participate in the Pension Plan, 100% in the Insurance Plan and 91% in the Good Neighbor Fund Program.

44 letters were written concerning deceased employees and their families during August regarding payment of monies from the Company, and general information.

*Participation in the Good Neighbor Fund is listed for the first time.

Employee and Public Relations

PERSONNEL PRACTICES

Military Reserve and Selective Service

Total number of non-veteran employees subject to military service training through Selective Service System.

607

Number Classified	1A	130
Number Classified	1AO	1
Number Classified	1D	52
Number Classified	2A	107
Number Classified	2S	1
Number Classified	3A	230
Number Classified	4A	3
Number Classified	4F	83
		<u>607</u>

Number of Technically Trained & Engineering Personnel for whom deferments are currently being requested.

119

Number of Non-Technically Trained & Engineering Personnel for whom deferments are being requested.

	<u>11</u>
Total	130

Accumulated total of deferments requested

1548

Accumulated total of deferments granted

1241

Current number of deferment requests pending

30

Current number of deferment requests denied

2

Current number of deferment requests granted

22

During Month of August

Number of deferment requests pending at Local Board Level

20

Number of deferment requests pending at Appeal Board Level

9

Number of deferment requests pending at Presidential Appeal Level

	<u>1</u>
Total	30

Number of deferment requests denied by Local Boards

1

Number of deferment requests denied by State Appeal Boards

1

Number of deferment requests denied by Presidential Appeal Board

	<u>0</u>
Total	2

Number of deferments granted by Local Boards

16

Number of deferments granted by State Appeal Boards

6

Number of deferments granted by Presidential Appeal Board

	<u>0</u>
Total	22

Employee and Public Relations

PERSONNEL PRACTICES

Military Reserve and Selective Services

Number of Technically Trained & Engineering Personnel denied, or requesting no further appeal, now pending induction	14
Number of Technical Graduates with over two years of deferments	80
Number of Selective Service vulnerable Technical Graduates Enlisted	0
Number of Selective Service vulnerable Technical Graduates Drafted	2
Number of Technical Graduates called to active duty under R.O.T.C.	0
Total	<u>2</u>

Reservists Data - Total Number of Reservists on Roll

Number of Active Reservists	165
Number of Inactive Reservists	503
Number of employees in the National Guard	19
Total	<u>687</u>

Reservists and National Guard members subject to drills, tours of duty, Cruises, Summer Camp and/or Weekly or Monthly meetings	254
--	-----

Military Service Leaves of Absence - August 1, 1950 through Aug.31,1955

Reservists	128
Selective Service System	284
Female Employees Enlisted	<u>7</u>
	<u>419</u>
Total number returned to roll	162

Reservists	71
Sel.Serv.System	91

Known number not claiming reemployment rights	44
Number of employees still on military leaves	225

EMPLOYEE AND PUBLIC RELATIONS DEPARTMENT

WORKMEN'S COMPENSATION AND SUGGESTION PLAN

<u>Suggestion Plan</u>	<u>July</u>	<u>August</u>	<u>Total Since 7-15-47</u>
Suggestions Received	193	231	17544
Acknowledgements to Suggesters	205	222	
Suggestions Pending Acknowledgement	21	30	
Suggestions Referred to Depts. For Investigation	255	272	
Suggestions Pending Referral to Departments	30	33	
Investigations Completed and Suggestions Closed	265	274	
Suggestions Adopted - No Award	1	0	
Adopted Suggestions Approved by Board for Award	96	97	
Total Net Cash Savings	\$15,679.99	\$18,689.22	
Total Cash Awards	\$2,100.00	\$2,500.00	
Total Number Suggestions Outstanding to Departments	547	551	

Approval was received from the Commission for an \$850 suggestion award. The suggestion pertained to an improved method of handling dichromate on the plant site and was submitted by an employee in the Reactor Section. The suggestion resulted in a reduction in shipping rates amounting to \$9,560 annually. Cost of adoption was \$1,156 for a net annual savings of \$8,404.

Life Insurance

Fifty-six requests for code information were received from insurance companies and investigation agencies and furnished during the month of August, 1955. The code information is supplied in accordance with a prearranged plan whereby employees of this project may be insured on the same basis as those working elsewhere.

Insurance Statistics

Claims reported to	<u>July, 1955</u>	
Department of Labor	<u>Long Forms</u>	<u>Short Forms</u>
	61	613
	<u>August, 1955</u>	
	<u>Long Forms</u>	<u>Short Forms</u>
	68	537

Total Since September, 1946 - 28,537

Claims reported to	<u>July, 1955</u>	<u>August, 1955</u>
Travelers	5	* 6

* Of the claims reported to Travelers Insurance Company during the month of August five were property damage and one was a bodily injury claim.

EMPLOYEE AND PUBLIC RELATIONS DEPARTMENT

WORKMEN'S COMPENSATION AND SUGGESTION PLAN

Workmen's Compensation

- a. Harry F. Reece, 8002254 — Date of Injury: Allegedly Between 1946 and 1948; Employer: General Electric Company; Nature of Injury: Unknown

Mr. Harry F. Reece, a former employee of the General Electric Company, submitted a claim to the Department of Labor and Industries alleging that he was suffering from an unknown condition which resulted from exposure to radioactive materials while he was employed on the Project between 1946 and 1948. A complete investigation was made by the Department of Labor and Industries and, as a result, an order was issued on August 9, 1955 rejecting Mr. Reece's claim on the basis that his condition was not the result of an industrial injury nor was it an occupational disease. Mr. Reece has 60 days following receipt of the Department's order to perfect an appeal. If he does not do so within that time we may consider the case closed.

- b. R. B. McCord — Date of Injury: 8-30-55; Employer: General Electric Company; Nature of Injury: Fatality

Mr. R. B. McCord, a foreman in the Metal Preparations Section, was injured when a salt bath furnace in the 328 building exploded. He was taken to Kadlec Hospital that evening and died the following morning. There is no question that the death resulted from the explosion and the matter has been informally reported to the Department of Labor and Industries. A formal report will be filed upon receipt of investigation and autopsy reports.

Liability Insurance

- a. Raymond West vs. Knox, Akridge & Overdahl, B-6835924

A Summons and Complaint was served against George J. Akridge, Clarence H. Overdahl and Ben Knox, Justice of the Peace of the Prosser precinct. The complaint by Mr. West alleged that he was falsely arrested by Mr. Akridge and Mr. Overdahl as a result of a bench warrant issued by Justice of the Peace, Knox. Both Messrs. Akridge and Overdahl are General Electric employees in the Richland police department. The amount alleged was \$93.00 special damages and \$5,000 general damages against each defendant. On 8-2-55 Judge B. B. Horrigan dismissed the action as to the General Electric policemen, Akridge and Overdahl.

- b. Doris Hall vs. General Electric, B-6835992

On August 15, 1955 a Summons and Complaint was served upon the General Electric Company on behalf of Doris Hall. The action is for damages for alleged personal injuries arising out of a collision which occurred on June 9, 1955 involving a private car driven by Miss Hall and a Government bus operated by a General Electric employee. The total amount claimed is \$51,250 plus costs. Miss Hall is not employed by the General Electric Company.

Employee and Public Relations
PERSONNEL PRACTICES

Technical Recruitment

Status of the recruiting for the Rotational Training Program may be summarized as follows:

<u>Field</u>	<u>Offers Extended</u>	<u>Offers Accepted</u>	<u>Offers Rejected</u>	<u>On the Roll</u>	<u>Estimated Requirements</u>
Engineering:					
Chemical	60	18	41	13	27
Mechanical	44	14	30	13	28
Electrical	31	11	19	11	17
Science:					
Chemistry	28	13	14	12	36
Physics	22	6	16	5	21
Metallurgy	12	3	8	3	15
Other:	<u>7</u>	<u>3</u>	<u>4</u>	<u>3</u>	<u>-</u>
Totals	204	68	132	60	144

Thirty-one offers have been extended to business graduates. To date sixteen acceptances and fourteen rejections have been received with one offer still outstanding. Requirements remain at twenty.

Experienced recruiting results for the year may be summarized as follows:

<u>Field</u>	<u>Open Invitations</u>	<u>To Visit</u>	<u>Open Offers</u>	<u>Acceptances not OTR</u>	<u>Offers to be Extended</u>	<u>On the Roll</u>
Engineering:						
Electrical	1	2	2	2		3
Mechanical	1	1		2	2	2
Chemical	1			2		2
Industrial		1	1			2
Metallurgical						1
Civil					1	1
Geological				1	1	
Science:						
Mathematics	1		1	1	1	
Chemistry	3		2	4		6
Physics			1	2		2
Biophysics						1
Physiology						1
Indus. Hygiene						1
Other:	<u>7</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>5</u>	<u>14</u>
Totals	7	5	8	15	5	36

Employee and Public Relations
PERSONNEL PRACTICES

PhD Recruiting

During the past month 15 new cases brought under consideration were considered, 10 visit invitations were extended, 9 candidates visited, 5 employment offers were extended, and 1 acceptance was received. One previous offer acceptance was rejected during the month. To date 15 PhD's have been put on the Hanford rolls since 10-1-54 and 6 acceptances are scheduled to report, all of whom are expected to be on the rolls by about November 1st. There are 19 PhD candidates who have accepted interview invitations and there are 4 open offers from whom no reply has yet been received. A total of 607 PhD candidates have been considered since 10-1-54.

The 1954-55 recruiting activities to date are summarized in the following table:

	<u>Cases</u> <u>Considered</u>	<u>Invitations</u>			<u>Visited</u> <u>To date</u>	<u>Offers</u>			<u>On the</u> <u>Roll</u>
		<u>Invited</u>	<u>Open</u>	<u>Accepted</u>		<u>Made</u>	<u>Open</u>	<u>Accepted</u>	
New PhD's	531	228	7	129	110	46	4	16	8
Experienced	<u>76</u>	<u>21</u>	<u>2</u>	<u>13</u>	<u>13</u>	<u>7</u>	<u>0</u>	<u>5</u>	<u>5</u>
Totals	607	249	9	142	123	53	4	21	13

Terminations

During August there were 29 terminations of technical or major exempt employees; 10 left for another job, 1 to return to school, 2 to military service, 1 was deceased, 2 professors and 1 graduate student completed summer assignment. There were 12 transfers to other GE sites including 9 to APED, San Jose.

Employee and Public Relations Department

EMPLOYEE COMMUNICATIONS AND PUBLIC RELATIONS

During the month of August, Press Relations issued 46 releases. The breakdown by category, distribution and content was as follows:

<u>Subject</u>		<u>Distribution</u>	
Pay and Benefits	2	Hanford Area	21
Employment Services	6	West Coast Area	16
Good Will	6	National	7
Technology and Research	23	Other Special	2
Utilities & Public Works	2		
Safety, Fire	1	<u>Content</u>	
Real Estate	1	Information	4
Administration and Legal	1	Pictures	10
Education and Library	3	Short	22
Richland	1	Long	9
		Feature	1

The following pictures with cutlines were forwarded to J. D. Morton for placement with national media: a picture showing a Hanford worker applying steam jet to remove radioactive contamination on a big crane; picture showing a new piece of equipment used for decontamination of small tools; new write-up on cutline for "Most Dressed Man"; picture of radiation monitor with antennae and headpiece recording atomic ray intensity; and picture showing transportation of uranium via railroad "water wagon".

Additional pictures and information were sent to the NATIONAL GEOGRAPHIC representative who visited Richland in July and tentatively plans to do a full-length feature on Hanford.

A long feature on the Nuclear School of Engineering was sent in its finally approved form to the Schenectady Press Relations. Pictures for this article were sent previously.

A story was forwarded to J. D. Morton on the uses of water in an atom plant, showing the worlds most common compound is vital in the field of atomic energy.

Additional pictures with cutlines on the atomic fashions story and the hydraulic lift for the polio victim were furnished the Schenectady Press Relations.

Pictures with cutlines of GE's and AEC's joint-entry float in the annual Atomic Frontier Days parade were sent to the GE NEWS, New York and to MONOGRAM. Praising the efforts of many civic groups, the float credited religious, military, educational and service groups with making Richland, home of Hanford Atomic Products Operation workers, a better place to live.

Copy for a booklet, "Atoms at Work," being prepared in Schenectady was sent to Hanford for approvals. It was approved with changes and returned. It will be distributed with SCHOLASTIC magazine.

A letter was prepared for C. N. Gross' signature giving W. D. Haylon additional facts and background on the AEC's proposed press tour at Hanford.

Employee and Public Relations

EMPLOYEE COMMUNICATIONS & PUBLIC RELATIONS

Permission was granted to the KERKER - Peterson Advertising Agency to list GE as a purchaser of master slave units in advertising and promotional material. It was explained that if any copy elaborates the listing, it must be sent to Hanford for approval.

The US Information Service approved the AEC and AEC in turn asked us to provide the names of Hanford engineers who speak fluent Spanish and who can appear on a "Voice of America" TV program to be telecast to Latin American countries. The program would be filmed in Washington in September and is on the subject of atomic future. I.M.A. Garcia and F. J. Mollerus were suggested.

In a conversation with Jim Holdsworth by phone he advised Public Communications that they were planning a news release with a September 1 release date saying that San Jose will be the official site of Commonwealth Edison project.

A story was sent to Pacific Northwest dailies and to western science journals on the promotion of P. R. McMurray to Manager of Radiological Engineering.

A story was sent to Pacific Northwest dailies on the accidental death of an employee.

Stories on the eleven Hanford papers presented orally at the Geneva "Atoms for Peace" conference originally sent to AEC Washington (previously reported) were revised and distributed throughout the Northwest and to selected trade journals. In addition, a story was written on a paper not presented orally, but printed in the proceedings. Copies of each of the complete papers were prepared and distributed to interested newspapers and trade journals.

Distribution of the Richland community telephone directories was described in a local release.

Pictures with outlines were sent to the GE NEWS, the two local papers and the SPOKESMAN-REVIEW illustrating a point made in one of the Geneva papers -- the fact that graphite expands when irradiated.

A local release describing the americium photometer developed by Hanford told of its prospects for use in general industry as well as in atom plants. (Another version of this release was originated here and distributed by Schenectady Press Relations. Our local release was coordinated with the general release.)

Registration for classes for the fall term of GE's School of Nuclear Engineering was announced in a local release.

Notice that the GE housing office will no longer accept applications for exchange by two families of government-owned houses in Richland was given in a local release.

Information about GE's training programs at Hanford was sent to Schenectady for inclusion in a report they are preparing for publication in ATOMIC INDUSTRIAL FORUM.

Photographs of Hanford motor installations were sent East for use in Apparatus Department.

GE float was entered in the Atomic Frontier Days parade on a noncompetitive basis.

Employee and Public Relations

EMPLOYEE COMMUNICATIONS & PUBLIC RELATIONS

AEC agreed to reimburse the \$500 cost of taking the Hanford float to parades at Kennewick and Prosser.

The first and second of the six community relations advisertments were placed in the GE NEWS, COLUMBIA BASIN NEWS and TRI-CITY HERALD.

The following manuscripts received all required approvals during the month:

G. E. Driver, "Tritium Survey Instruments," for publication in RADIATION RESEARCH.

J. W. Healy and L. C. Schwendiman, "Hydrogen Counter for Analysis of Dilute Tritium Oxide," for publication in RADIATION RESEARCH.

H. G. Rieck, I. T. Myers, and R. F. Palmer, "Standardization of Tri-
tiated Water Samples," for publication in RADIATION RESEARCH.

L. W. Smith, "The Current Status of the Industrial Use of Linear Programming," for publication in MANAGEMENT SCIENCE.

E. Hollister, "The Handling of Radioactive Materials," for publication.

E. C. Pitzer, "Thermogalvanic Corrosion of Aluminum in Water," for publication in the JOURNAL OF ELECTROCHEMICAL SOCIETY.

E. C. Pitzer, "Microthrowing Power: Physico-Chemical Aspects," for publication in the JOURNAL OF ELECTROCHEMICAL SOCIETY.

H. W. Lefevre, "New Gamma Rays in the Neptunium - 239 Decay," for publication in the PHYSICAL REVIEW.

The following papers received all required approvals during the month:

L. W. Smith, "Experience in Scheduling by Means of Dynamic Linear Programming," for distribution to Operation Research Society members.

C. A. Bennett, "Economy Through Experimental Design," for presentation at the Gordon Research Conference on Statistics in Chemistry and Chemical Engineering at Kimball Union Academy, Meriden, New Hampshire, August 8-12, 1955.

C. Groot "The Corrosion of Aluminum and Its Alloys," for publication as an unclassified report.

T. K. Bierlein, "Surface Attack by NaK on Zircaloy-2" (photographs) for presentation at the 10th ASM Metallographic Exhibit to be held at the National Metal Exposition in Philadelphia, Pennsylvania on October 17-21, 1955.

J. M. Davidson, "Experimental Thermal Conductivities of Gases and Gaseous Mixtures," for presentation at the American Physical Society meeting in Mexico City, Mexico on August 29, 30 and 31, 1955.

Employee and Public Relations

EMPLOYEE COMMUNICATIONS AND PUBLIC RELATIONS

L. W. Smith, Jr., "Model Building for Mathematical Programming," for presentation at the Second National Meeting of the Institute of Management Sciences to be held in New York City on October 20-22, 1955.

C. E. Michelson, "The Preparation of Fluoride Melts for Use in the Fluorimetric Method of Uranium Analysis," for issuance as an unclassified research and development report and for submission to the University of Idaho Graduate School as a thesis in partial fulfillment of the requirements for a Master of Science degree.

C. N. Spalaris, "Surface Characteristics of Artificial Graphite," for presentation at the 128th American Chemical Society National Meeting in Minneapolis, Minnesota on September 11-16, 1955.

E. S. Day, Jr., "Hanford Reactor Instrumentation," for presentation at the Nuclear Engineering and Science Congress in Cleveland, Ohio on December 12-16, 1955.

H. A. Moulthrop, "The Future of Plastics in Contamination Control," for presentation before the Richland Naval Reserve meeting at Richland, Washington.

Five weekly reports of significant Hanford developments were sent to J. R. L. Holdsworth at Schenectady for transmittal to F. K. McCune and C. W. LaPierre.

To help allay rumors of plant closure, resulting from predictions by a national radio and newspaper columnist, a statement by AEC Chairman Lewis Strauss refuting the prediction was disseminated as a Management NEWS Bulletin and also published in the August 5 GE NEWS.

Communication concerning the disposal legislation was discussed with Lucile Lomen, Harold Root and C. N. Gross. It was determined that any information put out at this time would be premature.

A visualizer-type report on Hanford's 1954 "Operation 4S" program was developed at the request of the Suggestion Plan secretary for entry in the National Association of Suggestion Systems Awards competition. The 50-page book contained examples of the entire promotion which was developed and presented to HAPO employees last year by Employee Communications.

Two Management NEWS Bulletins were distributed during the month.

Communications concerning Union negotiations included: priority message on GE's offer to Unions in the East; Management NEWS Bulletin item on status of negotiations; brochure detailing provisions of the revised Pension and Insurance plans; and Management NEWS Bulletin covering the Company's offer to the HAMTC. The latter two items are being held for distribution at an appropriate time during negotiations--probably early in September.

To alert employees concerning their security responsibilities in spite of information released at the Geneva "Atoms for Peace" conference, a security bulletin was recommended to Security and edited upon request, and Security was stressed in GE NEWS issues covering HAPO scientists' papers presented at the conference.

Employee and Public Relations

EMPLOYEE COMMUNICATIONS AND PUBLIC RELATIONS

Second and third place winners in the Personnel Meters Poster Contest were announced in the GE NEWS and award winning posters were placed throughout the plant. First place award winner will be announced in the September 2 GE NEWS. A total of 128 entries were received, a relatively high participation in light of the type of contest. Purpose of contest was to focus employees' attention on the importance of wearing personnel meters correctly, and this was accomplished through extensive GE NEWS publicity.

The nearing of community employees to winning the Central Safety Council Award prompted the planning and initiation of a special community safety publicity program.

Revising and updating the "nonexempt distribution list" was accomplished during the month. Through this list, printed communication materials will be distributed to nonexempt employees on the job at a saving of approximately \$163.00 for each distribution.

The following communication items were under revision or production during the month: fall term course catalog for the GE School of Nuclear Engineering; "Atomic Test" Technical Recruiting booklet, retitled "Horizons at Hanford;" "About Radiation" pamphlet for Hanford visitors; "Here's Hanford" booklet to reflect current organization changes; instruction sheet for supervisors on proper completion of weekly time cards.

Report of July promotion activities to increase enrollment in the Savings and Stock Bonus Plan was prepared.

Publications completed during the month included: radiation booklet, "One For The Record;" August issue of "Your Manufacturing Month;" August safety topic "Home--Dangerous Home," and August health bulletin on snoring.

Employee Benefits was assisted in planning publicity for the forthcoming "Let's Talk It Over" program.

Visit of Atomic Power Development Associates to Hanford was assisted through preparation of the program, name tags and copies of "Here's Hanford" booklet. Similar assistance was provided visit of the Puget Sound Utilities Council.

To promote vacation safety, pay envelope stuffers were printed and distributed with pre-vacation checks to employees.

Offsite GE publications distributed during the month included approximately 1300 copies of the GE REVIEW to a selected list, and the August issue of the MONOGRAM to all exempt employees.

Thirty-three movie showings were made to a total of 861 employees. The Ford Motor Company film "Technique for Tomorrow" on automation was requested for 21 showings during the month.

Posters distributed throughout the plant included: 90 copies each of four Elliott Service Company posters, and 115 Suggestion posters.

Employee and Public Relations

EMPLOYEE COMMUNICATIONS AND PUBLIC RELATIONS

New associate editor to replace H. B. Lindberg, who was promoted to editor of the GE NEWS during July, was placed on the rolls August 29. He is J. D. Prophet.

Special GE NEWS features during the month included: a five of a series of six articles on boating safety; Reactor Section safety booster contest; community employees nearing of Central Safety Council award, safety award prizes were declared as taxable income.

Major portions of two GE NEWS issues were devoted to reports covering HAPO scientists' papers presented at the Geneva conference.

Atomic Frontier Days, and the GE-AEC parade float were given prominent GE NEWS publicity during the month.

Suggestion Plan publicity in two August issues covered distribution of \$3750 suggestion dollars.

News from other GE operations covered by the HAPO GE NEWS during the month included fiftieth anniversary of Photo Flash Bulb, and launching of GE's first atomic sub-marine.

The August 26 GE NEWS announced courses for the GE School of Nuclear Engineering. Solely as a result of this publicity, registrations during the first two days of enrollment were considerably above those of a year ago.

To stress promotion opportunities at Hanford, ten promotions and transfers were announced in the August 26 issue of the GE NEWS, and promotion of the General Manager's secretary was covered in a feature type story.

Two August issues of the GE NEWS carried full-page reprints of Community Relations advertisements appearing in community newspaper.

Employee Communications' commercial artist was on vacation during two weeks of the month. Artwork completed during the month included: two GE NEWS photo layouts, layouts and final art for three Community Relations advertisements, photo retouching, layouts and final art for three Personnel Meters Poster contest posters and one editorial cartoon on the subject, revised layout for cover of fall GENE course catalog, layout and final artwork for September health bulletin, and miscellaneous artwork.

In addition, Employee Communications' commercial artist laid out and assembled the Operation 4S entry for the National Association of Suggestion Systems Awards contest. This work involved approximately 18 hours of casual overtime.

The one hundred twenty-seventh consecutive weekly broadcast of G-E's HANFORD SCIENCE FORUM reached the air lanes this month. HAPO now enjoys the distinction of producing General Electric's sole radio program which bears the well-known title.

Five broadcasts of the HAPO-produced radio feature INSIDE HANFORD were aired over the Eastern Washington network this month, and included the tenth program of the current series.

Employee and Public Relations

EMPLOYEE COMMUNICATIONS AND PUBLIC RELATIONS

A complete new Studio Agreement for off-site motion picture production work was prepared by Audio-Visual Communications to be presented in proposal form to the AEC to supplant the present contract which has been deemed inadequate.

The preliminary scenario for the 16 mm. motion picture THE KW REACTOR INCIDENT being produced for the Engineering Department was completed and given to the technical advisors for review and comment.

A complete cataloging by subject of the 100,000 feet of original motion picture film of 100-K and Purex areas produced on the Current Construction Program for the AEC and G-E during the last two and a half years was completed this month.

HANDS ACROSS THE ATOM, a 15 minute 16 mm. motion picture on G-E's radio-metallurgy development was completely revamped for presentation at the "Hot Laboratories" meeting being held in Washington, D. C. Another 15 minute 16 mm film was also produced on REACTOR VIEWING WINDOWS for presentation at the same meeting.

The HAPO-produced 16 mm. color motion picture HERE'S HANFORD was televised by Richland station RTVC as its initial program during ceremonies held August 10.

The first local "live" telecast of the G-E HANFORD SCIENCE FORUM was produced this month by Audio-Visual Communications in cooperation with television station RTVC-Channel 2. This feature will be produced and telecast twice a month on a sustaining basis.

At the request of the Reactor Section, a unique tape recording, including special sound effects, was produced for the 100 Area Safety Booster campaign, for use in conjunction with their animated displays.

Audio-Visual Communications, at the request of Public Communications, recorded special music and devised and installed a special sound system for use on GE-AEC's float exhibited in Richland, Kennewick and Prosser, Washington.

<u>Distribution of Graphics August Assignments</u>	<u>Percent</u>
General Administrative (Including Operations Research)	2
Employee and Public Relations	12
Engineering	45
Manufacturing	10
Financial	8
Radiological Sciences	17
Atomic Energy Commission	6

	<u>July</u>	<u>August</u>
Total assignments completed	51	42
Total assignments backlog	46	49

Three drawings were completed which illustrate how a highly contaminated stainless steel tube and step plug was removed from the 100-H Reactor.

Employee and Public Relations

EMPLOYEE COMMUNICATIONS AND PUBLIC RELATIONS

Three visual aids were prepared which explain the operation and some of the problems involved in using an "Ion Accelerator." Drawing one illustrated a nuclear reaction producing neutrons by bombarding a tritium-zirconium target with H plus protons. Drawing two shows how the speed of a neutron is measured. The use of deflection plates and an oscillator to thin out concentration in a "Deuteron Beam" is illustrated. The drawing also shows the various measurement instruments. Drawing number three illustrates the methods of calibrating film packets and a neut.

A perspective illustration was prepared of a newly designed "Graphite Convection Boiling Reactor." Details illustrated include the graphite unit, major piping, steam drums, vertical and horizontal rod system, ball 3X feed lines, downcomers, crossheaders, drain systems, gas header and charge and discharge facilities.

A detailed perspective illustration was completed showing an "Elevated Temperature Tensile Furnace." A cut-a-way was made through the outer-structure in order to show details of working parts of the furnace. Details illustrated include sight tubes, coils, pull rods, specimen grips and proper specimen positioning.

A series of visual aids are being prepared which will illustrate step by step the proper use of equipment in removing process tubes from the reactors. This assignment involves "on the spot" study of the varied pieces of equipment, their use and proper procedure for handling. The completed set is urgently needed for training purposes and every effort will be made to rush this assignment to completion.

The perspective cut-a-way illustration of the 1706 KER Recirculation Test Facility will be completed this week. This has been quite an extensive assignment involving considerable time in projection of piping, equipment and building structure. It was originally intended that a model would be constructed of this project, however, the illustration has been developed as a substitute and may fill the need without the expense of a model.

<u>Graphics Statistical Summary</u>	<u>Charts or Graphs</u>	<u>Illustrations</u>	<u>Other</u>
Report Material (Includes Technical Publications)	186	31	27
Technical or Scientific Illustrations	-	8	-
Mechanical Art (Flow charts, schematics, maps, etc. - not for publication)	19	-	-
Lecture Material (Includes plates for slides)	7	8	-
Posters	-	-	-
General (Posting of current data, assembly, revisions, etc.)	51	-	-

A total of 322 photographic assignments were covered for the month of August, 1955, 11,498 prints were produced of which 2,595 were "A" and "B" photographs; 6,104 were area and news. 1,024 negatives were exposed.

See attached statistical report for Photography Unit.

PHOTOGRAPHY UNIT
MONTHLY REPORT
AUGUST, 1955

	2"	2"	4"	5"	8"	8 1/2"	11"	11"	16"	N	35mm Color Slides	35mm B&W Slides	3 1/4" X 4" Color Slides	3 1/4" X 4" B&W Slides	16mm M.P. Film
EMPLOYEE & PUBLIC RELATIONS	1	30													
EDUCATION & TRAIN. Train. & Develop.	6		4		24					11					
EMP. COMM. & PUBL. RELATIONS										2					
Public Comm.	41			13	177					50					
Audio-Visual	2														
Empl. Comm.	53	14	59	19	127					178					
Graphics	3							9				1		1	1000 ft.
AUXILIARY OPER. & PLANT PROTECT.	1	13													
Telephone	1							24							
Security & Patrol	1	5394								8					
Patrol	1				21										
COMMUNITY															
Fire	3									10					
Police	13		50	4	48					69					
Comm. Oper.	1	5													
Engineering	1				8					4					
HEALTH & SAFETY															
Safety & Fire	1				19										
ENGINEERING															
ADVANCE ENGR. Pile Fuels	1							18		2			1		2000 ft.
DESIGN										1					
Process Engr.	10				25					52				5	
Design Engr.	7				12			139		29				3	

PHOTOGRAPHY UNIT
MONTHLY REPORT
AUGUST, 1955(Con't)

	2"	2"	4"	5"	8"	8 1/2"	11"	11"	16"	N	35mm Color Slides	35mm B&W Slides	3 1/4" X 4" Color Slides	3 1/4" X 4" B&W Slides	16mm M.P. Film
PROJECT															
Project Engr.	2		109			20				4					
PILE TECH.															
Metal Res.	19			9		249	13	3		54				11	
Pile Materials	10				43	78				23				4	
Pile Engr.	13				48	472				56				23	
Fuel Tech.	23	1		1		1939				177					
SEPARATIONS TECHNOLOGY	6					49		3		10				7	
Chem. Devel.	4					153				6					
Chem. Research	7					71				33				10	
MANUFACTURING															
PLANT ENGR.	1					24				5					905 ft.
REACTOR	5									28					
Process	12				73	3				12					
Power	1			31	36	55				6					
Maintenance	3					16				9					
Projects & Personnel Dev.	1				2	169				2					
SEPARATIONS	4	21								26					
Project Eng.	1				24	84				10					
METAL PREP.	8	38	6			43				14					
PLANT SERVICES	1									12					400 ft.
SEPARATIONS EXP. PROGRAM	4				44	8				22					
ELECTRICAL UTILITY	1									11					

PHOTOGRAPHY UNIT
MONTHLY REPORT
AUGUST, 1955(Cont)

FINANCIAL	10	64													
RADIOLOGICAL															
SCIENCES															
RADIOLOGICAL	4	27								18		1			5
RECORDS & STANDARDS															
BIOPHYSICS	13	80	78	106						41					
BIOLOGY	8			105						12	6		21		9
RADIOLOGICAL	3	4	9							8	1		1		
ADMINISTRATION & COMMUNICATIONS															
A.E.C. SAFETY	2		18												
A.E.C. SECURITY	2	1	4												
A.E.C. CONSTRUCTION	2		24												
A.E.C. OPERATIONS	1		10							5					
A.E.C. TRAFFIC	1		9							4					
TOTAL	322	5585	185	503	204	886	4107	22	6	1024	7	2	38	78	4305

TOTAL ASSIGNMENTS	JUNE	AUGUST
NEGATIVES	300	322
TOTAL PRINTS	1,279	1,024
	14,196	11,498

Employee and Public Relations

UNION RELATIONS

Union Relations - Operations Personnel

Contract negotiations with the four HAPO bargaining units have been in progress since August 11. For the most part, discussions have been confined to the Hanford Atomic Metal Trades Council with other units willing to permit them to set the pattern which would then be acceptable to them as a basis for settlement of their contract demands. Progress has been normal with the primary emphasis being placed by the HAMTC on union security in excess of what was offered Company-wide. The Company's offer was provided to the HAMTC on August 29 and considerable resistance has been voiced by the Council against acceptance in its present form. Negotiations are continuing on approximately a daily basis.

The Hanford Atomic Metal Trades Council brought suit against the Company in June in which they charged that the Company unilaterally decided to disregard and supersede a "working agreement" which originated in 300 Area and which was signed by supervision and a group of Chemical Worker stewards in May 1953. Outside counsel has been retained and together with the attorney (business representative) for the Council have agreed that this matter will be included in the current negotiations and that the court action would be permitted to remain in status quo until such time as a new or amended agreement between the Company and the Council was executed. In the event the matter of the working arrangement was not resolved by these negotiations, the parties then could proceed with litigation.

By letter of June 27 the National Labor Relations Board refused to issue a complaint against the Company in connection with the unfair labor practice charge brought by the Council regarding the closing of the Prosser barricade. The Council appealed that decision and to date the Board in Washington, D. C., has not ruled on the appeal.

Grievance Statistics:

A total of thirty-two (32) grievances were received and one (1) Step II grievance meeting was held during the month. A breakdown of the grievances received and processed follows:

ALL DEPARTMENTS

	<u>HAMTC</u>	<u>HGU</u>	<u>BSEIU</u>	<u>Total Unit</u>	<u>Total Nonunit</u>	<u>Total</u>
Received this month	32	0	0	32	0	32
Received this year	335	3	1	339	15	354
Step I						
Pending July 31	0	0	0	0	0	
Settled this month*	25	0	0	25	0	25
Settled this year	223	2	0	225	5	230
Pending August 31	1	0	0	1	0	

*Grievances brought to Step II prior to June 1, 1955, but never processed by the union are, for the purpose of this report, considered settled at Step I.

Employee and Public Relations

UNION RELATIONS

ALL DEPARTMENTS (Cont'd.)						
	<u>HAMTC</u>	<u>HGU</u>	<u>BSEIU</u>	<u>Total Unit</u>	<u>Total Nonunit</u>	<u>Total</u>
Step II						
Pending July 31	57	0	1	58	1	
Settled this month**	23	0	0	23	1	24
Settled this year	108	2	0	110	10	120
Pending August 31	41	0	0	41	0	
Arbitration						
Pending July 31	0	0	0	0		0
Settled this month	0	0	0	0		0
Settled this year	0	1	0	1		1
Pending August 31	0	0	0	0		0
Total settled this month	48	0	0	48	1	49
Total settled this year	331	5	0	336	15	351

BY DEPARTMENTS

	<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	13	150	8	96	9	48
Separations - Unit	4	88	4	75	3	19
- Nonunit	0	8	0	3	4	9
Metal Preparation - Unit	5	38	6	21	0	12
- Nonunit	0	1	0	0	1	1
Transportation - Unit	0	18	0	10	2	9
Electrical Utilities - Unit	0	4	0	2	0	2
Stores - Unit	0	5	1	3	2	4
Employee and Public Relations						
Community - Unit	0	7	0	1	1	3
Aux. Ops. and Pl. Pro. - Unit	2	18	1	10	2	10
Radiological Sciences - Unit	8	11	5	7	0	0
- Nonunit	0	1	0	1	0	0
Engineering - Nonunit	0	3	0	0	0	2
Financial - Nonunit	0	2	0	1	0	1
Total	32	354	25	230	24	120

*Grievances brought to Step II prior to June 1, 1955, 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, 1955 are, for the purpose of this report, considered settled at Step II.

Employee and Public Relations

UNION RELATIONS

BY SUBJECTS

Unit	<u>Manufacturing</u>		<u>Emp. & Pub. Relations</u>		<u>Radiological Sciences</u>		<u>Engineering</u>		<u>Financial</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>	<u>This Mo.</u>	<u>This Year</u>	<u>This Mo.</u>	<u>This Year</u>
Recognition	0	1	0	0	0	0				
Discrimination	0	3	0	0	0	0				
Jurisdiction	6	120	0	11	1	1				
Health-Safety-Sanitation	0	11	0	3	0	2				
Hours of Work	1	16	2	3	0	0				
Overtime Rates	7	44	0	3	3	4				
Vacations	0	1	0	0	0	0				
Seniority	3	24	0	0	2	2				
Wage Rates	2	21	0	1	0	0				
Miscellaneous	2	60	0	2	2	2				
Sick Leave	1	2	0	0	0	0				
Grievance Procedure	0	2	0	0	0	0				
<u>Nonunit</u>										
Continuity of Service	0	1	0	0	0	0	0	0	0	0
Overtime Rates	0	0	0	0	0	0	0	0	0	1
Wage Rates	0	6	0	0	0	0	0	1	0	0
Miscellaneous	0	0	0	0	0	1	0	1	0	0
Working Conditions	0	1	0	0	0	0	0	0	0	0
Work Assignment	0	0	0	0	0	0	0	1	0	1
Holidays	0	1	0	0	0	0	0	0	0	0
Total	22	314	2	23	8	12	0	3	0	2

Construction Liaison

An issue involving the question of whether or not construction bus drivers who transported construction workers to the job site and home in addition to their regular duties during the normal working hours were entitled to isolation pay for travel to and from the area was heard before Arbitrator Judge Harold Seering in Richland on June 24, 1954. Argument and submissions in this case were not completed until March 24, 1955. In a decision dated August 11, 1955, it was the award of the Arbitrator that "man haul" bus drivers are not entitled to receive isolation pay and that the grievance be denied.

Employee and Public Relations

SALARY & WAGE ADMINISTRATION

In addition to the normal flow of routine work in Salary and Wage Administration, the following work was conducted during August:

1. During the month selected positions in the Engineering Department were audited. An audit of property accounting positions in the Financial Department has been completed and a report will be issued shortly. Some proposed changes in contract auditing positions are being delayed pending results of a study of the effects of these changes on positions in higher organizational levels.
2. Proposed revisions to positions in the Manufacturing, Employee and Public Relations, and Engineering Departments were studied. Definite action on these changes is currently awaiting decisions from the departments involved.
3. A revised listing of HAPO representative positions by departments was prepared and submitted to appropriate department managers. The revised listing consists of 167 positions, a net increase of 22 positions, of which 94 positions, or 56.3%, are currently reconciled. Plans are being made for a reconciliation trip by a Section employee to other Company components for the purpose of reconciling additional HAPO positions.
4. Upon request, data were supplied to other Company components pertaining to established HAPO salary administration procedures, position descriptions, etc.
5. Contact has been made with two outside companies in an effort to confirm the levels for exempt positions in the Procedures & Computing function at HAPO. The Section also participated in surveys being conducted by the Goodyear Atomic Corporation and the Professional Engineers of Oregon.
6. A revision of the Exempt Employee Performance Appraisal Form was completed which incorporated suggestions offered by various HAPO departments and other sources. A copy of this revised form will be sent to department managers for study and comment. The form was reviewed with H. B. Meyer, Consultant, Personnel Practices and Research Services.
7. A summary report was prepared showing effect of shift adder on selected supervisory positions in the Manufacturing and Employee and Public Relations Departments.
8. Special statistical charts were prepared for Section use for comparison and control purposes in reviewing the several types of salary actions for exempt employees.
9. General adjustment appraisal lists were submitted to appropriate department managers for review and revisions. These lists will form the basis for application of Company-wide general adjustments in salaries of exempt employees, subject to approval of the General Manager. Procedures for handling these adjustments, if approved, have been established.
10. A request for reimbursement authorization was prepared and submitted to the AEC covering the Company-wide adjustment in salary ranges in the exempt salary structure.

11. The wage rate study continued and the status of the three major classifications of non-exempt jobs is as follows:
 - a. A modified list of manual job rankings was reviewed by the Company Negotiating Committee and revisions suggested by that group have been incorporated in the list.
 - b. A list of job groupings of semi-technical jobs has been submitted to department managers for comment.
 - c. A preliminary list of clerical-functional job rankings was analyzed and selected jobs are being recompiled where necessary. The clerical rankings will be submitted to department managers for comment in the near future.
12. Section personnel participated in discussions with management and Union Relations personnel regarding provisions of the offer to be made to local labor unions during contract negotiations. A substantial number of statistical charts and tables were compiled for this purpose which were derived from the various sources currently available: i.e., Company dispatches, the HAPO 1955 Northwest Area Wage Survey, etc.
13. Study of stenographic and secretarial jobs at HAPO continued during the month but progress was limited because accumulation of job descriptions for a selected group of these employees consumed most of the month.
14. The July 1 revision of the HAPO Organization Directory was distributed locally and to selected off-site G.E. personnel.
15. No major organization changes were effected during the month.

Employee and Public Relations

EDUCATION AND TRAINING

The report of the Education and Training Section is submitted as follows:

ROTATIONAL TRAINING PROGRAM

Present Assignments

The technical graduates on the Rotational Training Program are assigned to departments as follows:

<u>Department</u>	<u>Last Month</u>	<u>This Month</u>
<u>Engineering</u>		
Pile Technology	11	14
Separations Technology	5	5
Design	6	3
Project	4	7
<u>Manufacturing</u>		
Metal Preparation	3	4
Separations	6	8
Reactor	11	9
<u>Radiological Sciences</u>		
Biology	0	0
Records & Standards	0	1
Bio-physics	4	4
<u>Financial</u>		
Procedures & Computing	2	2
<u>Employee & Public Relations</u>		
Aux. Operation & Plant Protection	2	0
Education & Training	1	0
	<u>55</u>	<u>57</u>

Permanent Placements

There were four placements off the Program as follows:

Design	- 1
Pile Technology	- 1
Bio-physics	- 1
Reactor-Process	- 1

Employee and Public Relations Department
EDUCATION AND TRAINING SECTION

Nine placements were anticipated, but it now appears that the other five will be placed in September.

There was one transfer of a technical graduate from the Program to another component of the G.E. Company; namely, an electrical engineering graduate from the University of Santa Clara with one year's service transferred to the Oakland, California plant.

Additions

There were seven new trainees reporting on the Program. Their fields of training are as follows:

Electrical Engineering	- 3
Physics	- 2
Mechanical Engineering	- 1
Chemistry	- 1
Total	7

One of the electrical engineering graduates is a transfer from the Schenectady Engineering Program making a total of 3 obtained from their program by direct transfer this year. The mechanical engineering graduate was employed on the Engineering Program also, but entered military service due to ROTC training commitments prior to reporting to our Program.

Selective Service

There was one loss of a young technically trained man to Selective Service. Seventy-three per cent of the men lost to Selective Service to date have been through the draft; the others chose to enlist rather than await a draft call. Indications are that the ratio will remain constant among the 117 men now vulnerable, and that losses will continue at a rate of 1-2 per month.

Letters expressing interest in the employee's army career are being sent to all young technical employees going into the armed services. Addresses of these men are obtained so that the "Works News" and the "G. E. Review" can be sent to them on a regular schedule. Arrangements have been made to send to such employees the 1956 G.E. Pocket Diary.

Technician Training Program

A total of 54 transfer requests were reviewed from present employees requesting consideration for transfer to the Technician Training Program. Of this number, 14 were selected for transfer. The majority of the rejected requests were due to a lack of proper educational backgrounds; namely, mathematics and science in high school courses. Letters expressing appreciation for their interest are being sent to all persons whose transfer request could not be approved. Also, letters to the 14 accepted employees are being issued explaining the risks inherent to the Program and other pertinent information.

Transfers to the Program from other sections are scheduled for September 12. The

Employee and Public Relations Department
EDUCATION AND TRAINING SECTION

18 new employees carefully selected from high schools throughout the state are being permitted to report on September 9. It was necessary to employ these trainees since the quota of 32-34 could not be met among the available present employees without lowering the standards.

Security clearances for the new employees were requested mostly between August 3 and August 10, since completion of hiring arrangements had to follow the consideration of present employees who were interested. Although the majority of these new trainees will not have clearance when they report, it is expected that suitable temporary assignments can commence. Rotational assignments are being established in the following sections:

<u>Section</u>	<u>No. of Trainees</u>
Pile Technology-Pile Materials	3
Pile Technology-Pile Engineering	9
Pile Technology-Metallurgy	2
Pile Technology-Fuel Technology	3
Separations Technology-Analytical	2
Separations Technology-Chemical Research	1
Separations-Analytical	6
Reactor-Process	2
Metal Preparation-process	2
Bio-physics	<u>2</u>
Total	32

Educational classes to parallel the work assignments are scheduled to start the week of September 12. Initially intermediate algebra, college algebra and college physics (without a lab session) will be offered. College credit is being sought for the college algebra at W.S.C.

A procedures description was prepared on the policies and operation of the Program.

Employee and Public Relations Department
EDUCATION AND TRAINING SECTION

SCHOOL OF NUCLEAR ENGINEERING

Fall 1955 Semester

Registration for Fall classes begins Monday, August 29, 1955, and will continue through the first week of classes - September 12-16, 1955. Nineteen graduate courses and thirteen 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 or Intermediate Algebra and General Physics offered for the trainees in the Technician Training Program.

A course announcement listing all Fall courses and tentative Spring courses has been prepared for mailing to all new technical graduates who have come to the plant since 1950, plus students who have been active during the past two years. A full-page announcement and story were prepared and issued in the G.E. News issue of August 26, 1955. To further supplement the above mailings and announcements, this bulletin will be sent to each section's correspondent who will aid in its distribution in his organization. A letter to department managers and to the general manager with a copy of the bulletin completes the distribution.

With increased interest in the college-level and vocational subjects as evidenced by last Spring's enrollment, a separate announcement of college-level and vocational courses has been prepared for distribution through the correspondents to:

1. Instrument craftsmen
2. Engineering assistants
3. Laboratory assistants
4. Technicians
5. Radiation monitors
6. Electricians
7. Power operators
8. Accounting clerks
9. Design draftsmen

Visits

Glenn Jones, Director of the Washington State College General Extension Service was in Richland on August 10 to confer with us about the college-level courses we will be offering this fall in business administration and mathematics. College type courses in the technician training program were also discussed and it appears that credit for these courses may be obtained from the State College of Washington.

Submission of Course and Instructor Material

Information on each course and instructor will be submitted next week to the four affiliated universities for their consideration and approval.

Employee and Public Relations Department
EDUCATION AND TRAINING SECTION

Conferences with Professors Employed During the Summer

On August 9 Professors E. D. Ayres and R. F. Durnford met with members of the School Electrical Engineering staff to

1. Discuss the school Electrical Engineering graduate study program
2. Discuss teaching aids used on the campus
3. Exchange information on specific courses
4. Meet and get acquainted with other members of similar engineering background.

On August 11 Professors A. L. Babb and L. A. Jobe met with the HAPO instructors of Chemical Engineering subjects for an analogous discussion. These meetings point out:

1. The willingness of the parties to meet others and discuss mutual problems
2. The eagerness of the professors to learn as much as possible about the G.E. educational evening study program
3. That our tentative graduate study programs towards the M.S. degree appear quite satisfactory to these men. Some suggestions were made in supporting courses.
4. That further exchange of personnel between the colleges and industry would be quite valuable.

Professor W. F. Engesser of Oregon State College gave five lectures on Industrial Engineering to over 100 supervisors in the plant. This series of lectures was sponsored by Plant Engineering for the benefit of project personnel. As a follow-up to these lectures, Professor Engesser has met with smaller selected groups to discuss problems confronting Process groups in Metal Preparation, Separations and Reactor Sections.

Since Professor J. Washburn has been working directly with the metallurgists during this summer, no special meeting was set up.

Employee and Public Relations Department
EDUCATION AND TRAINING SECTION

PERSONAL DEVELOPMENT

Participation in training programs has remained high during the past month, but slight decreases may be evident for the remainder of the year. This can be forecast due to the fact that many programs presented during the summer months were short introductory programs, plus the fact that the seasonal Non-Exempt Rating Program has been responsible for a large percentage of participation in August. On the other hand we expect greater participation for the remainder of the year than for the like period last year. The increased awareness of the importance of training and the better functioning of the correspondent relationship should bring this about. A revised Stenographic Program is being offered and should account for some increased participation in the over-all picture. Although program presentation and participation for the remainder of this calendar year should remain relatively high, we are now looking forward to next year's production with the prospect that additional programs and increased awareness of training will produce even better results next year than we have experienced during 1955.

Job Relations Development was presented 8 times during the month with a total attendance of 89 exempt personnel:

Friday, August 5 - White Bluffs - 16 Community Operations Unit supervisors
(two presentations)
Monday, August 8 - W-10, special meeting for 23 exempt File Technology
personnel
Thursday, August 11 - W-10, 11 supervisors in various departments
(regularly scheduled meeting)
Friday, August 12 - White Bluffs, 17 supervisors (two presentations)
Tuesday, August 16 and
Wednesday, August 17 - W-10, 22 exempt personnel of Auxiliary Operations
Unit

All of these presentations except the regularly scheduled one on the 11th were one hour presentations which presented the principles and methods of the program but did not get into the discussion and case history study.

Responsibilities of a Supervisor (McGregor) was presented eight times during the month with a total attendance of 94 exempt personnel as follows:

Wednesday, August 3 - Transportation Section - 13 supervisors
Friday, August 5 - Community Operations - 16 supervisors
(two presentations)
Monday, August 8 - W-10, exempt personnel - 23 of File
Technology Section
Wednesday, August 10 - Transportation Section - 14 supervisors
Friday, August 12 - Patrol Unit - 17 supervisors
(two presentations)
Wednesday, August 17 - Transportation Section - 11 supervisors

Employee and Public Relations Department
EDUCATION AND TRAINING SECTION

"The Inner Man Steps Out" was presented nine times during the month with a total attendance of 108 area supervisors:

August 2 and 3 (4 presentations) Reactor Section - 46 supervisors
August 9, 10, 11 (5 presentations) 100 and 200-E Areas - 62 supervisors

Besides a showing of the film, a short introduction and a discussion period after the film showing makes up this program. Although total elapsed time for this program is only about an hour and a half, a very effective point is put across, and participation by the groups has been enthusiastic.

Customer Relations was presented five times during the month in the 200-W area (August 2, 9, 16, 23 and 30) with total attendance of 42 exempt and non-exempt personnel. This program has been scheduled on a weekly basis and will continue at least through the month of September.

Labor Management Relations was presented Wednesday, August 3, with 15 exempt personnel attending. Since negotiations with the local unions are now underway this program must be changed to incorporate any changes which come about as a result of a new contract. The program essentially is an explanation and discussion of our local agreements.

Your Stake in American Industry was presented at two regularly scheduled meetings on August 4 with ten exempt personnel attending and on August 29 with 22 exempt personnel in attendance. A special presentation was held for 23 exempt technical personnel on Monday, August 8. Mr. Howard Bennett, Manager of Economic Education, attended the presentation on August 8 and was very complimentary about the material and its presentation.

G.E. and the Chemist, describing G.E. organization and some major fields of technology which are found throughout the Company, was held Friday afternoon, August 12 for 28 Pile Technology exempt personnel of the 300 Area. This program was specially requested and was prepared and presented by the Manager of the Education and Training Section.

Report Writing was presented the mornings of August 8 and 10 in the 300 Area. Seventeen exempt personnel of the Metal Preparation Section were in attendance. A great deal of interest is shown in this program (in the Metal Preparation Section) and we have future presentations requested. This program does not cover the preparation of engineering or technical reports, but attempts to offer guides, hints and procedures which will make any report more readable and down to earth.

The Non-Exempt Rating procedure program has been in great demand during the past month and was conducted 21 times with a total attendance of 210 supervisory personnel.

August 9 and 10 (4 presentations)	Reactor Section	- 31 supervisors
August 15 -	200-E	- 15 supervisors
August 16 -	(2 presentations) 100-K & 100-B	- 15 supervisors
August 17 -	(2 presentations) 100-D & 100-F	- 25 supervisors
August 18 -	300 Area	- 15 supervisors
August 19 -	200-E	- 20 supervisors
August 22 -	300 Area	- 7 supervisors
August 23 -	(2 presentations) 100-K & 100-B	- 14 supervisors

Employee and Public Relations Department
EDUCATION AND TRAINING SECTION

August 24 - (2 presentations) 100-D & 100-H - 17 supervisors
August 26 - 200-E - 8 supervisors
August 30 - (2 presentations) 100-B & 100-K - 14 supervisors
August 31 - (2 presentations) 100-D & 100-F - 18 supervisors

Effective Human Relations was presented to ten supervisory personnel of the 300 Library Technical Information Unit. Ordinarily these three conferences are spread out with intervals of four weeks between meetings. However, since this was a special group, all three sessions were completed within the month.

Another P.M.S. group, No. 82, met Monday, August 15 through Wednesday morning, August 24, in the Pistol Range conference room with 23 area supervisory personnel completing the course. The completion dinner meeting for Groups 82, 81 and 80 was held Wednesday evening, August 31, at the Desert Inn with 56 members and guests present. The General Manager and the Manager of Employee and Public Relations were the guest speakers.

Conference Leading was conducted Thursday, August 18, at the request of the Transportation Section with 9 supervisory personnel participating. The regularly scheduled conference leading program was conducted on Thursday, August 25, with a participation of 12 exempt personnel.

A preview of the revised Secretarial-Stenographic program was presented Tuesday afternoon, August 23 with 28 women employees in attendance. Comments were received from each of the participants and the program is presently being further revised to incorporate suggestions made by this group of experienced secretaries. It is planned that this program will be presented in the plant areas by girls who have had experience in secretarial work as well as the ability to get their ideas across to others.

The Training Unit, in cooperation with Personnel Practices Section, prepared the G. E. "broadside", interview techniques sheet, and interview check sheet for the "Let's Talk It Over" interviews. These are intended as aids for all plant supervision in connection with the non-exempt ratings. Since distribution of the first copies during the week of August 8 - 12, we have had requests to supply an additional 1,078 check sheets to various supervisors.

During the month training program attendance records of 233 employees were prepared on requests from supervisors.

Recognition of attendance at training programs has been given much thought during the past month and a procedure has been devised which we hope to put into effect shortly. Wallet cards are being prepared to be presented to individuals completing programs, supervisors of individuals attending programs will be advised, and a permanent record of program attendance will be maintained in the central personnel file. This procedure should be operating by the first of October.

Employee and Public Relations Department
EDUCATION AND TRAINING SECTION

UNIVERSITY RELATIONS PROGRAM

Summer Program personnel in the three programs--(1) college juniors, (2) graduate students, and (3) college professors--are now returning to their respective campuses. These three groups have been employed through the summer with the sections as follows:

I. College Juniors

Design	1
Procedures & Computing	1
File Technology	4
Separations Technology	1
Metal Preparation	1
Reactor	<u>1</u>
Total	9

II. Graduate Students

Procedures & Computing	2
File Technology	2
Reactor	<u>1</u>
Total	5

III. College Professors

File Technology	3
Design	1
Procedures & Computing	1
Separations Technology	1
Plant Engineering	<u>1</u>
Total	7

Comments on the performance of all these individuals have been highly favorable. Contacts are now being made to establish sections desiring to continue this program in the summer of 1956 so that approvals can be obtained and the program initiated to promote the locating and employing of suitable candidates early in the coming school year. Also this will facilitate the security clearance procedure

Employee and Public Relations Department
EDUCATION AND TRAINING SECTION

ADMINISTRATIVE

Existing criteria for measurement within the Section have been favorably received by Mr. Murray; with his help, further measurements are being developed.

A report on HAPO Education and Training activities was prepared on an urgent basis for the Public Relations Section for review by Schenectady and for use by the Industrial Atomic Forum.

Mr. Ross Shearer of the Personnel Branch, AEC, Washington, D.C., visited us August 4th to discuss possibilities for training employees of other companies. Preliminary discussions were held with Managers in several Departments, and a list of possible training locations and assignments is now being prepared for final review by the interested Managers. Authorizations in the proposed GE-AEC contract have been carefully reviewed and will be kept in mind before any commitments are made.

EMPLOYEE & PUBLIC RELATIONS DEPARTMENT
HEALTH & SAFETY SECTION
AUGUST 1955

General

Personnel Changes

Five additions and eight deletions resulted in a decrease to 218.

Employee Relations

Employee attendance at 42 meetings was 242.

Visits

Harold Wright of the Methodist National Board of Hospitals and Homes of Chicago, Rev. Scheyer, Washington State Executive Secretary, and Rev. Ortmeyer, District Representative, and a group of Sisters of Providence of Seattle, were visitors interested in possible future Kadlec Hospital Operation.

Mr. Eugene Pray, Administrator of Pullman Hospital, Pullman, Washington, and their staff psychiatrist, Dr. Puddy, were Kadlec Hospital visitors for discussion of the care of psychiatric patients.

Industrial Medicine

Dispensary visits increased from 5,214 to 5,952 and medical examinations decreased from 957 to 925. The first operations fatality occurred August 31st as a result of an explosion in the 300 Area. The cause of death was "blast concussion with involvement of the respiratory center."

Sickness absenteeism was 1.38% versus 1.17% for July while total absenteeism was 2.26% versus 1.91% for July. The year to date total absenteeism of 2.30% compares with 2.38% for 1954.

Safety & Fire Prevention

	<u>Operations</u>		<u>Community</u>	
	<u>August</u>	<u>Year to Date</u>	<u>August</u>	<u>Year to Date</u>
Major Injuries	1	4	0	0
Sub-Major Injuries	6	18	0	0
Near Serious	4	41	0	2
Total Injuries	421	3438	24	213
Frequency		0.35		0
Severity		549		0

The 200 East Area has operated 1,091 days with an exposure of 2,240,000 man hours without a disabling injury and on September 3 they became eligible for their third consecutive safety award pin. Fire apparently caused from a discarded cigarette resulted in \$2,500 damage to a parked area passenger bus in the 100-B Area. Other fire losses during the month were estimated at \$125.

Kadlec Hospital

The average daily adult census increased from 47.1 to 53.0 as compared to 57.3 a year ago. July Kadlec Hospital net expense decreased \$8,705 from the month of June. It resulted from decreased material, supply and personnel costs. June costs however were higher than usual due to fiscal year end closing.

HEALTH & SAFETY SECTION

AUGUST 1955

General (Continued)

Public Health

Communicable diseases reached the lowest level of the year.

The proposed merger with the Benton-Franklin County Health District was postponed by the district pending disposal of Richland.

Social services to the community have been reduced by two-thirds with the resignations of Mrs. Dorothy Liddick and Mr. Robert Miller.

Costs-July

	<u>July</u>	<u>June</u>	<u>July Budget</u>
Industrial Medicine	\$45,782	\$46,059	\$48,583
Public Health (Oper.)	7,919	8,064	9,283
Kadlec Hospital (Net)	19,174	27,879	22,612
Hospital Expense Credits	1,784	1,615	1,566
Safety & Fire Prevention	<u>12,044</u>	<u>29,676</u>	<u>14,416</u>
Total-Health & Safety	\$86,703	\$113,293	\$96,460

The net cost of operating the Health and Safety Section for July before charges were assessed to various departments was \$86,703, approximately \$26,600 less than for June and \$10,000 below the budget for July. The major changes were due to (1) an accrual of \$18,000 made in June to cover the cost of safety awards and (2) a decrease of \$9,000 in hospital costs created by lower than normal costs in July following the high period in June in connection with year-end closing. Costs for August in the hospital operation will probably increase, but an expected increase in revenue may be more than offsetting.

It should be noted that the hospital operation for July resulted in a budget underrun despite the fact that the patient load was considerably below the anticipated level.

HEALTH & SAFETY SECTION

AUGUST 1955

Industrial Medical Services

The total number of dispensary visits increased from 5,214 to 5,952. The August, 1954, total was 4,768. This represents an increase of 738 over last month and an increase of 1,194 over August, 1954. All dispensaries recorded increases in both occupational and non-occupational visits. There were 29 nurses and one nurse aid on the non-exempt roll.

The total number of physical examinations decreased from 957 to 925.

The first operations fatality occurred August 31st as a result of an explosion in the 300 Area. The cause of death was "blast concussion with involvement of the respiratory center." General Electric also sustained six sub-major injuries. There were no major or sub-major injuries sustained by contractor employees.

The Health Activities Committee met on August 17th. Material on the health topic "Unconsciousness" was presented and prepared for distribution throughout the plant. A booklet entitled "Some Facts You Should Know About Mental Health" was sent out also to all HAPO supervision, with a strong plea for reading the information.

Sickness absenteeism for August was 1.38%. The year to date total figure ending August 31 was 1.54%. The comparative 1954 figure was 1.62%.

Net costs for the month of July increased approximately \$1,000 over the June level. Decrease in Utilities and Supplies costs were more than offset by increased salary costs and a decrease in expense credits for services rendered to construction contractors. Supply costs were down substantially due to (1) a high level of charges in June due to year end closing and (2) a short month in July for booking costs. Salary costs include a large retroactive payment made to one of the industrial doctors for area differential.

Costs-Operations

	<u>July</u>	<u>June</u>	<u>Increase (Decrease)</u>
Salaries	\$35,850	\$34,118	\$ 1,732
Continuity of Service	2,884	2,559	325
Laundry	148	163	(15)
Utilities, Transportation, Maintenance	3,862	4,697	(835)
Supplies and Other	<u>3,929</u>	<u>5,426</u>	<u>(1,497)</u>
Total Gross Costs	46,673	46,963	(290)
Less: Revenue	891	904	13
Expense Credits	<u>11,677</u>	<u>12,991</u>	<u>1,314</u>
Net Cost of Operation	\$34,105	\$33,068	\$ 1,037

While both net costs and gross costs for July were considerably below budgeted levels, it should be noted that personnel is also below anticipated levels. Addition of industrial doctors to the rolls should bring gross costs very near budget.

HEALTH & SAFETY SECTION

AUGUST 1955

<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	89	124	1030
Rehire	9	10	127
Annual	256	243	1615
Interim	14	9	340
A.E.C.	20	30	208
Re-examination and recheck	140	133	1166
Termination	95	106	689
Sub-total	623	655	5175
<u>Contractors</u>			
Annual	3	1	87
Pre-employment	125	105	1262
Recheck	57	33	376
Re-examinations	0	0	1
Termination and Transfer	90	86	425
Interim	59	45	262
Sub-total	334	270	2413
Total Physical Examinations	957	925	7588
<u>Laboratory Examinations-Clinical</u>			
<u>Operations</u>			
Government	89	87	785
Pre-employment, Termination, Transfer	1133	1436	19208
Annual	1435	1384	8914
Recheck (Area)	88	81	1843
First Aid	15	24	123
Sub-total	2760	3012	30873
<u>Contractors</u>			
Pre-employment, Termination, Transfer	1481	1293	2774
Total Clinical Laboratory Examinations	4241	4305	33647
<u>X-Ray</u>			
<u>Operations</u>			
Government	7	5	102
Pre-employment, Termination, Transfer	111	200	2790
Annual	312	296	2234
First Aid	65	87	673
Sub-total	495	588	5799
<u>Contractors</u>			
Pre-employment, Termination, Transfer	204	167	371
First Aid	11	8	19
Sub-total	215	175	390
Total X-Ray	710	763	6189
Electrocardiographs	161	140	908
Physical Therapy Cases Referred	223	227	1895

HEALTH & SAFETY SECTION

AUGUST 1955

<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	508	604	4279
Occupational Case Retreatments	1949	2183	14601
Non-occupational Treatments	2702	3036	22895
Sub-total	5159	5823	41775
<u>Construction</u>			
New Occupational Cases	8	25	632
Occupational Case Retreatments	44	79	2025
Non-occupational Treatments	3	25	791
Sub-total	55	129	3448
Total First Aid Treatments	5214	5952	45223
<u>Major Injuries</u>			
General Electric	0	1	4
Contractors	1	0	3
Total	1	1	7
<u>Sub-Major Injuries</u>			
General Electric	1	6	18
Contractors	0	0	2
Total	1	6	20
<u>Nurses Visits</u>			
Calls made	1	1	16
Employee Personal Illness	1	1	13
No. absent due to illness in family	0	0	1
No. not at home when call was made	0	0	2

HEALTH & SAFETY SECTION

AUGUST 1955

Kadlec Hospital

The average daily adult census increased from 47.1 to 53.0 as compared to 57.3 a year ago. This represents an occupancy percentage of 48.6 broken down as follows: Mixed Service (Medical, Surgical and Pediatrics) 50.9; Obstetrical Service 38.6. A further breakdown of the Mixed Service shows an occupancy percentage of 35.1 on Medical, 67.3 on Surgical and 53.7 for Pediatrics.

The minimum and maximum daily census ranged as follows

	<u>Minimum</u>	<u>Maximum</u>
Mixed Service	34	59
Obstetrical Service	4	13
Total Adult	38	72

The average daily newborn census decreased from 10.5 to 8.3 as compared to 12.7.

Nursing hours per patient per day:

Medical, Surgical, Pediatrics	3.78
Obstetrical	6.55
Newborn	4.10

The increase in nursing hours on the obstetrical service and in the newborn nursery resulted from the drop in the patient census on these services. The census on these services was the lowest experienced in several years.

The ratio of inpatient hospital employees to patients (excluding newborn) for the month of July was 2.64. When newborn infants are included the ratio is 2.16.

The net expense for the operation of Kadlec Hospital for July was \$19,174 as compared with \$27,879 for June. Summary is as follows:

Kadlec Hospital net expense	\$19,174
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This is a decrease of \$8,705 from the month of June. It resulted from a decrease of almost \$10,000 in costs due to unusually high costs incurred in June as a part of the year end closing and also decreased material, supply and personnel costs. Revenue also decreased \$1,300 due to a drop in patient census and expense credits went up \$169.

Mr. Eugene Pray, Administrator of Pullman Hospital, Pullman, Washington, and the staff psychiatrist at this hospital, Dr. Puddy, visited Kadlec Hospital. They were interested in discussing the care of psychiatric patients in a general hospital and the physical facilities needed. This information was needed in connection with their plans to establish a small psychiatric ward at the Pullman Hospital.

HEALTH & SAFETY SECTION

AUGUST 1955

Kadlec Hospital (Continued)

We had a second visit from representatives of the Methodist Hospitals and Homes organization which has expressed interest in taking over operation of Kadlec Hospital when it is released by General Electric - AEC. Present with the group were Rev. Robert Ortmeyer, Rev. and Mrs. Scheyer, and Mr. Harold Wright, a member of the National Board of the Methodist Hospitals and Homes.

The hospital also had a visit from four Catholic sisters representing the Sisters of Providence from Seattle. They, too, had expressed an interest in operating Kadlec Hospital and wanted to tour the physical plant.

Following is a summary of employee relations meetings held in the Health and Safety Section during the month of August.

	<u>Meetings</u>	<u>Attendance</u>
Hospital	31	179
Industrial Medicine	4	16
Public Health	5	29
Safety & Fire Prevention	1	12
General	<u>1</u>	<u>6</u>
Total	42	242

HEALTH & SAFETY SECTION

AUGUST 1955

Hospital Unit (Continued)	July	August	Year to Date
<u>Kadlec Hospital</u>			
Average Daily Adult Census	47.1	53.0	59.0
Medical	10.0	13.0	15.7
Surgical	21.1	21.7	22.3
Pediatrics	6.3	10.2	10.4
Mixed	37.3	44.8	48.4
Obstetrical	10.1	8.1	10.6
Average Daily Newborn Census	10.5	8.8	10.8
Maximum Daily Census:			
Mixed Services	58	59	83
Obstetrical	15	13	19
Total Adult Census	69	72	95
Minimum Daily Census:			
Mixed Services	20	34	20
Obstetrical Service	6	4	3
Total Adult Census	29	38	29
Admissions: Adult	397	426	3686
Discharges: Adult	400	415	3683
Medical	63	104	858
Surgical	199	184	1593
Pediatrics	59	69	609
Mixed	321	357	3060
Obstetrical	79	58	623
Newborn	72	56	576
Patient Days: Adult	1460	1642	14325
Medical	309	403	3824
Surgical	654	672	5412
Pediatrics	194	315	2521
Mixed	1157	1390	11757
Obstetrical	303	252	2568
Newborn	326	272	2625
Average Length of Stay: Adults	3.7	4.0	3.9
Medical	4.9	3.9	4.5
Surgical	3.3	3.7	3.4
Pediatrics	3.3	4.6	4.1
Mixed	3.6	3.9	3.9
Obstetrical	3.8	4.3	4.1
Newborn	4.5	4.9	4.6
Occupancy Percentage: Adults	43.2	48.6	54.1
Medical	27.0	35.1	42.4
Surgical	65.9	67.8	69.7
Pediatrics	33.2	53.7	54.7
Mixed	42.4	50.9	55.0
Obstetrical	48.1	38.6	50.5
Newborn	40.4	33.8	41.5
(Occupancy Percentage based on 109 adult beds and 26 bassinets.)			

HEALTH & SAFETY SECTION

AUGUST 1955

<u>Hospital Unit (Continued)</u>	<u>July</u>	<u>August</u>	<u>Year to Date</u>
<u>Kadlec Hospital (Continued)</u>			
Avg. Nursing Hours per Patient Day:			
Medical, Surgical, Pediatrics	4.52	3.78	
Obstetrics	5.45	6.55	
Newborn	3.42	4.10	
Avg. No. Employees per Patient (excluding newborn)	2.64		
Operations: Major	73	66	527
Minor	69	63	567
E.E.N.T.	49	49	451
Dental	0	1	6
Births: Live	64	60	570
Still	1	1	11
Deaths	4	5	30
Hospital Net Death Rate	.64%	.21%	.28%
Net Autopsy Rate	0	60.0	36.7
Discharged Against Advice	1	0	5
One Day Cases	57	128	1146
Admission Sources:			
Richland	83.4	83.3	82.0
North Richland	.3	.9	4.6
Other	16.4	15.7	13.4
Admissions by Employment:			
General Electric	74.3	79.8	75.3
Government	4.1	1.9	2.8
Facility	6.5	6.6	6.1
Contractors	5.0	4.0	6.8
Schools	.5	0.7	1.2
Others	9.6	7.0	7.8
Hospital Outpatients:			
First Aid	484	525	3866
Clinical Laboratory	98	121	1171
Bacteriological Laboratory	30	51	383
X-Ray	176	143	1291
Physical Therapy	223	232	2341
<u>Physical Therapy Treatments</u>			
Outpatient Treatments	260	219	2465
Hospital	45	40	612
Total	305	259	3077
<u>Pharmacy</u>			
No. of Prescriptions Filled	2084	2401	19591
No. of Store Orders Filled	402	529	3947

HEALTH & SAFETY SECTION

AUGUST 1955

<u>Hospital Unit (Continued)</u>	<u>July</u>	<u>August</u>	<u>Year to Date</u>
<u>Kadlec Hospital (Continued)</u>			
<u>Clinical Laboratory Examinations</u>			
Outpatient Examinations	275	430	3142
Hospital	2919	3182	27270
Public Health	0	0	1
Total	3194	3612	30413
<u>X-Ray Examinations</u>			
Outpatient Examinations	124	162	1324
Hospital	155	220	1642
Public Health	12	0	70
Total	291	382	3036
<u>Electrocardiographs</u>			
Outpatient Examinations	2	1	14
Hospital	8	27	199
Total	10	28	213
<u>Bacteriological Laboratory</u>			
Treated Water Samples	225	253	1664
Milk Samples (Inc. Cream & Ice Cream)	47	55	302
Other Bacteriological Tests	292	446	3632
Total	564	754	5598
<u>Patient Meals</u>			
Regulars	2243	2511	22026
Children under 8	419	486	5232
Specials	578	548	5438
Softs	519	608	4581
Tonsil and Adenoid	69	70	650
Liquids	124	167	1103
Surgical Liquids	83	116	684
Total	4035	4506	39714
<u>Cafeteria Meals</u>			
Noon	1307	1337	12132
Night	246	294	2257
Total	1553	1631	14389

HEALTH & SAFETY SECTION

AUGUST 1955

Public Health Unit

The number of reported cases of communicable diseases reached the lowest level of the year, 37, and 25% of this represented streptococcal disease among military personnel in North Richland. One case of poliomyelitis was reported which had no relation to the vaccination program in June.

The loss of staff members has continued with the resignations from Social Service of Mrs. Dorothy Liddick and Mr. Robert Miller. This has necessitated a corresponding decrease in the service available to the community.

The department was also notified that the proposed merger with the Benton-Franklin Health District had not been voted upon favorably.

Of the 194 contacts made by social service counselors this month, 110 were directly concerned with family relationships; 46 related to marital conflict, 63 to difficulties between parents and their children and one with unmarried parenthood.

Personality and behavior problems were the focus of 74 contacts. There were 20 direct contacts with children, 14 with adolescents and 40 with adults. In addition, four contacts were made in regard to problems stemming from mental illness, five regarding medical financial problems and one dealing with old age.

In addition to the regular food handling inspections, a total of 14 itinerant restaurants were inspected and approved for operation. Two restaurants were found to have a score below 80 and were warned of degrading process next month unless the score is brought up. Principle violations found in restaurants included proper cleaning of equipment and care of dishwashing machine. Flies were found to be prevalent in a few establishments. One new tavern was approved for operation.

Bacteriological results of pasteurized milk samples were satisfactory with the exception of one distributor. This plant was inspected and the trouble was isolated. Samples from this producer have shown improvement over preceding month.

Water and sewage samples were satisfactory from the bacteriological standpoint.

Three citations were issued for improper disposal of trash and refuse. The burning ground, located on Saint Road, was found to be in an insanitary condition and the area was burned and refuse covered.

Eleven dog bites were investigated for rabies control.

Mosquito control program operated satisfactorily. Control methods consisted mainly of larviciding.

HEALTH & SAFETY SECTION

AUGUST 1955

Public Health (Continued)	July	August	Year to Date
<u>Education</u>			
Pamphlets distributed	9,990	8,991	92,961
News Releases	10	6	73
Staff Meetings	1	1	7
Classes	1	1	80
Attendance	5	9	1,102
Lectures & Talks	3	3	56
Attendance	57	250	2,777
Films Shown	0	1	123
Attendance	0	80	4,599
Community Conferences & Meetings	16	13	109
Radio Broadcasts	8	9	59
<u>Immunizations</u>			
Diphtheria	0	0	235
Diphtheria Booster	1	0	915
Diptussis	0	0	15
Tetanus	0	0	1
Tetanus Booster	2	0	276
Pertussis	0	0	1
Pertussis Booster	1	0	272
Schick Test	1	0	1
Smallpox	1	0	1,645
Tuberculin Test	6	6	45
Typhoid	0	1	1
Immune Globulin	13	0	93
Other	0	0	1
First Polio Series	0	0	795
Second Polio Series	102	0	476
<u>Social Service</u>			
Cases carried over	70	48	678
Cases admitted	11	11	108
Cases closed	33	25	183
Remaining case load	48	34	603
Activities:			
Home Visits	1	4	12
Office Interviews	207	190	2,235
Conferences	39	28	383
Meetings	7	3	92
<u>Sanitation</u>			
Inspections made	81	81	864
Conferences held	32	24	203

HEALTH & SAFETY SECTION

AUGUST 1955

<u>Public Health (Continued)</u>	<u>July</u>	<u>August</u>	<u>Year to Date</u>
<u>Communicable Diseases</u>			
Chickenpox	21	7	224
Erysipelas	0	0	1
German Measles	6	6	68
Impetigo	0	0	6
Influenza (U.R.I.)	0	0	4
Infectious Mononucleosis	0	0	9
Infectious Hepatitis	4	0	17
Measles	6	2	27
Meningitis	0	0	2
Mumps	4	7	430
Pinkeye	0	0	7
Pneumonia	0	0	1
Poliomyelitis	1	1	2
Rheumatic Fever	0	0	1
Ringworm	1	0	12
Roseola	1	1	19
Salmonellosis	0	1	1
Scarlet Fever	1	0	119
Strep. Infection (Throat)	28	12	41
Tuberculosis	0	0	6
Whooping Cough	7	0	16
Total	80	37	1,013
 Total No. Nursing Field Visits	 376	 207	 3,173
Total No. Nursing Office Visits	24	34	332

COMMUNITY SECTION

AUGUST 1955

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
Maintenance & Renovation Unit	9	146	9	146
Police Unit	16	25	15	25
Commercial & Residential Property Unit	7	24	7	25
Fire Unit	51	0	50	0
Transfer Study	1	0	1	0
Community Operations Administration	1	1	1	1
Electrical Unit	5	14	5	16
Engineering Unit	7	4	7	4
Water & Sewerage Utilities Unit	5	21	5	22
Library Unit	3	10*	4	9*
Public Works & Recreation Unit	<u>7</u>	<u>54</u>	<u>7</u>	<u>49</u>
	113	300	112	298

	<u>Exempt</u>	<u>Nonexempt</u>
Additions to Payroll	1	7
Transfers In	0	6
Removals from Payroll	2	9
Transfers Out	0	6

Net decrease 3

*Includes two half-time employees.

CIVIL DEFENSE

The newly formed Community Civil Defense Advisory Committee held their third and fourth meetings on August 2 and August 9 respectively. This Committee is in the process of revising the operating procedures and policies with respect to Civil Defense in Richland in order to reduce the possibility of confusion in the event of an evacuation of the Community.

It is anticipated that the evacuation route marker signs will be all in place early in September. The Committee will continue to work on the revision of the Civil Defense Plan booklet until it is completed and will attempt to resolve problems as they arise and keep the public informed of their part in the planning through appropriate publicity.

General Electric representatives on this Committee will do all they can to assist the Atomic Energy Commission in discharging its responsibility with respect to Civil Defense planning.

MAINTENANCE AND RENOVATION UNIT

August, 1955

	<u>Exempt</u>	<u>Nonexempt</u>
Employees - Beginning of month	9	146
New additions	0	3
Transfer in	0	1
Transfer out	0	3
Retirement	0	1
Employees - End of month	9	146

INTERIOR PAINT REPORT - FY 1956

August, 1955

FOREMEN: R. A. CHAMBLISS, D. W. LUKINS, M. E. TAPPAN

TYPE UNIT	NO. UNITS SCHEDULED	COMPLETED THIS MONTH	COMPLETED TO DATE	BALANCE TO BE PAINTED
A	400	1	6	394
B	344	2	4	340
C	160	0	0	160
D	2	0	0	2
E	23	1	1	22
F	64	0	0	64
G	4	0	0	4
H	67	0	0	67
K	57	0	0	57
L	37	0	0	37
M	7	0	0	7
Q	28	1	1	27
R	21	0	0	21
S	5	0	0	5
T	0			
U	77	0	0	77
V	182	0	0	182
Y	11	0	0	11
Z	2	0	0	2
LBP	4	0	1	3
2BP	21	2	5	16
3BP	6	0	0	6
Tract	19	0	1	18
1BR Apt.	26	0	0	26
2BR Apt.	69	0	0	69
W-13 Apt.	0			
Dormitories	5	0	0	5

TOTAL	1641	7	19	1622
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3 Units added

Est. MH B. F.	583	Actual MH B. F.	661½
Est. MH This Month	<u>343</u>	Actual MH This Month	<u>390</u>
Total Est. MH	926	Total Actual MH	1051½

EXTERIOR PAINT REPORT - FY 1956

August, 1955

FOREMEN: R. A. CHAMBLISS, D. W. LUKINS, M. E. TAPPAN

TYPE UNIT	NO. UNITS SCHEDULED	COMPLETED THIS MONTH	COMPLETED TO DATE	BALANCE TO BE PAINTED
A	109	52	84	25
B	169	106	151	18
C	85	0	0	85
D	1	1	1	0
E	13	5	5	8
F	73	53	56	17
H	56	26	34	22
K	60	0	0	60
L	2	0	2	0
1BP	97	4	4	93
2BP	599	15	15	584
3BP	494	4	4	490
Tract	7	2	3	4
2BR Apt.	9	0	0	9
W-13 Apt.	1	0	0	1
Dormitories	19	0	0	19
TOTAL	1794	268	359	1435

Est. MH B. F. 4,800
Est. MH This Month 12,835

Total Est. MH 17,635

Actual MH B. F. 3,375
Actual MH This Month 10,795

Total Actual MH 14,170

Spray time to date: 587 MH

PLUMBING SHOP

August, 1955

FOREMAN: F. L. ELSENSOHN

Electric water heaters replaced	11
Laundry trays replaced	22
Miscellaneous plumbing work orders completed	18
Cleared major sewer stoppages caused by tree roots	65
Cleared major sewer stoppages in main sewers for Public Works	3
Plumbing for floor and sink linoleum	127
Plumbing for new shower stalls replaced	5
Repaired or replaced blacktop walks	3
Replaced street steps	14
Steam work orders completed	1
Radiators completely repaired in dormitories	47
Worked on plumbing service orders	103.2 hours
Loaned one plumber to Public Works	12 hours

Made routine steam inspection once each week in Government owned commercial facilities, dormitories and apartments.

Excavated with backhoe machine and handwork for the cleaning out of roots in sewer lines, and to repair all leaking and broken underground piping, and backfilled.

Landscaped where sewers and other lines were dug out and trees were removed, and seeded excavated portions.

SERVICE ORDER CREW

FOREMAN: L. F. CARPENTER

A. Service orders on hand at beginning of month	650
B. Received during the month	1906
C. Completed during the month	1685
D. On hand at end of month	871

E. A total of 106.9 hours were spent on work orders.

F. Backlog of incomplete service orders by craft:

Plumbing	265	
Carpentry	82	
Electrical	97	
Electrical	<u>427</u>	Fire inspections
Total	871	

RENOVATION AND LABOR CREW

August, 1955

FOREMAN: B. C. BAIN

Houses renovated	59
Minor carpenter repairs to renovated houses	41
Trash pickups	39
Minor carpenter repairs to dormitories	7
Renovation minor paint jobs	21
Complete paint jobs	2
Redecorated following a fire	1
Houses sprayed for insect control	6

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.

MECHANICAL SHOP

FOREMAN: Z. H. MAYBERRY

A. Millwright Crew:

Furnace service orders	85
Routine furnace inspections	230

All air coolers in dormitories were inspected and lubricated.

About 4000 weep tubes were made for outside carpenters on prefabs.

Two men have been helping on the overhaul of heating plant at the new Transportation Garage for the past three weeks.

B. Sheetmetal Crew:

Shower stalls installed	7
Smoke pipes replaced	25
Replaced gutters	10
Installed coal hatch flashings	6

Both Sheetmetal men spent 4 days at 200-E Area assembling lockers.

C. Service Crew:

Tree removal orders completed	42
Topsoil orders	6
Tree stump removal orders for Electrical	23
Sidewalks repaired	5

LINOLEUM AND CARPENTER SHOP

August, 1955

FOREMAN: R. M. MARTIN

Repaired bath wall tile	3
Replaced bath floor linoleum	29
Repaired bath floor linoleum	1
Replaced kitchen floor linoleum	28
Repaired kitchen floor linoleum	2
Replaced bedroom floor linoleum	1
Replaced living room floor linoleum	2
Replaced dining room floor linoleum	2
Replaced steps and landing linoleum	20
Replaced sink top linoleum	100
Repaired sink top linoleum	2
Replaced cupboard top linoleum	4
Replaced work bench linoleum	22
Replaced kitchen sinks	16
Chempoints	142
Paint touch ups	92
Repaired porches	153
Jack & shim	5
Replaced thresholds	1
Repaired exterior doors	2
Drilled weepholes	19
Repaired roofs	5
Repaired walls	1
Sidewalk forms	2
Ranch house window screens	44
Ranch house ladders	31
Street steps	12
Replaced screen doors	250
Repaired screen doors	90
Prefab window screens	369
Replaced window sills	9
Repaired work bench linoleum	1

COMMUNITY SECTION
RICHLAND POLICE DEPARTMENT
MONTHLY REPORT
AUGUST 1955

ORGANIZATION

	EXEMPT	NON-EXEMPT
EMPLOYEES - BEGINNING OF MONTH	16	25
TRANSFERS IN	0	0
TRANSFERS OUT	0	0
NEW HIRES	0	0
TERMINATIONS	<u>1</u>	<u>0</u>
TOTAL - END OF MONTH	15	25

GENERAL

ON AUGUST 16, CHIEF H. W. STROCK ATTENDED THE GOVERNOR'S NO-HOST AWARD BANQUET AT OLYMPIA, AT WHICH TIME THE STATE OF WASHINGTON WAS PRESENTED WITH THE GRAND AWARD FOR TRAFFIC SAFETY BY THE NATIONAL SAFETY COUNCIL. GOVERNOR ARTHUR B. LANGLIE ALSO ACCEPTED THE AWARD WON BY THE STATE IN THE NATIONAL PEDESTRIAN PROTECTION CONTEST SPONSERED BY THE AMERICAN AUTOMOBILE ASSOCIATION.

THE FINAL PHASE OF THE ANNUAL STREET STRIPING PROGRAM WAS COMPLETED THIS MONTH. THIS PROGRAM CONSISTED OF PAINTING 46.4 MILES OF CENTER LINES; 107 INTERSECTIONS, WITH ONE OR MORE MARKED CROSSWALKS; AND STENCILS READING "SCHOOL ZONE, 20 MILES PER HOUR" OR "SLOW DOWN AND LIVE" PAINTED AT 44 LOCATIONS THROUGHOUT THE CITY.

THE INTERNATIONAL ARMORED CAR, WHICH FOR A NUMBER OF YEARS HAS BEEN ASSIGNED TO THE RICHLAND POLICE DEPARTMENT, WAS RETURNED TO TRANSPORTATION. THIS RETURN WAS MADE POSSIBLE BY THE DISCONTINUANCE OF BANK MONEY ESCORT SERVICES TO THE NORTH RICHLAND BANK.

A JEEP STATION WAGON WAS RECEIVED THIS MONTH AS A REPLACEMENT FOR AN OLDER JEEP VEHICLE, WHICH WAS RETURNED TO TRANSPORTATION.

TRAFFIC

	1955		1954		1955	1954
	JULY	AUG.	JULY	AUG.	TOTAL TO DATE	TOTAL SAME PERIOD
RICHLAND						
REPORTABLE ACCIDENTS	10	17	12	23	146	157
PROPERTY DAMAGE ACCIDENTS	6	15	10	19	126	135
INJURY ACCIDENTS	4	2	2	4	20	22
TOTAL PERSONS INJURED	5	2	2	4	24	22
FATAL ACCIDENTS	0	0	0	0	0	0
ACCIDENTS-DAYLIGHT HOURS	7	15	11	16	109	111
DARKNESS "	3	2	1	7	37	46
ACCIDENTS-BUSINESS DISTRICT	4	8	5	2	44	40
RESIDENTIAL "	5	6	6	14	74	91
OTHER "	1	3	1	7	28	26
ACCIDENTS INVESTIGATED	8	12	8	17	99	97
CRIMINAL COMPLAINTS FILED	4	9	6	14	54	72
VIOLATIONS CONTRIBUTING TO ACCIDENTS:						
NEGLIGENT DRIVING	4	3	1	4	20	28
FAIL. TO YIELD RIGHT OF WAY	4	5	8	8	44	49
FOLLOWING TOO CLOSELY	5	2	2	1	24	26
DRUNK DRIVING	0	1	0	0	3	2
PEDESTRIAN VIOLATION	1	1	0	2	5	5
INATTENTION TO DRIVING	0	2	0	1	4	1
RECKLESS DRIVING	0	0	0	2	1	5
SPEEDING	0	0	0	0	1	1
UNSAFE SPEED	0	0	0	1	18	21
IMPROPER BACKING	0	0	0	1	6	8
DISREGARDING STOP SIGN	0	0	0	1	4	1
HIT AND RUN	0	0	0	0	0	0
IMPROPER PASSING	1	1	1	1	5	2
IMPROPER TURN	0	0	0	0	3	1
FAILURE TO SIGNAL	0	0	0	0	1	1
WIDE RIGHT TURN	0	1	0	0	1	1
BICYCLE VIOLATION	0	1	0	1	4	3
DEFECTIVE EQUIPMENT	0	0	0	0	2	0
WRONG SIDE OF ROAD	0	0	0	0	1	0
ANIMAL IN ROAD	0	0	0	0	2	0

	1955		AVE. PER ACCIDENT 1955		AVE. PER ACCIDENT 1955	
RICHLAND	JULY	AUGUST	JULY	AUGUST	JULY	AUGUST
ACCIDENT PROPERTY DAMAGE	\$2,775.00	\$2,420.91	\$277.50	\$130.63	\$323.50	\$191.94

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	19
NUMBER OF MEN FIRED OVER THE ARMY-L COURSE	19

QUALIFICATIONS ON THE ARMY-L COURSE AS FOLLOWS:

EXPERT	6	30%	SHARPSHOOTER	2	10%
MARKSMAN	10	55%	UNQUALIFIED	1	5%

ACTIVITIES	JULY	AUGUST
BANK ESCORTS AND DETAILS	1	0
BICYCLES IMPOUNDED	2	1
BICYCLE VIOLATIONS, OTHER	0	0
BICYCLES REGISTERED	25	35
CHILDREN LOST OR FOUND	15	12
COMPLAINTS INVESTIGATED	84	116
DEATHS REPORTED	1	0
DOG, CAT, LOOSE STOCK COMPLAINTS	10	15
DOGS, CATS, REPORTED LOST OR FOUND	11	8
DOORS, WINDOWS, FOUND OPEN IN FACILITIES	69	76
EMERGENCY MESSAGES DELIVERED	15	10
FIRES INVESTIGATED	6	6
GUNS REGISTERED	2	15
LAW ENFORCEMENT AGENCIES ASSISTED	8	4
LETTERS OF INQUIRY	143	158
MISCELLANEOUS ESCORTS	5	6
PERSONS INJURED BY DOGS	1	4
PLANT DEPARTMENTS ASSISTED	33	7
PRISONERS PROCESSED THROUGH JAIL	9	7
PRIVATE INDIVIDUALS ASSISTED	47	51
PROPERTY LOST OR FOUND	16	12
RECORDS INQUIRIES	39	38
REPORTS PROCESSED THROUGH RECORDS	147	195
STREET LIGHTS OUT REPORTED TO ELECTRICAL	106	66
TRAFFIC SAFETY MEETINGS (AUGUST ATTENDANCE 70)	4	3
TOTALS	799	845

MONTHLY REPORT
RICHLAND POLICE DEPARTMENT
AUGUST 1955

OFFENSES	KNOWN	UNFOUNDED	CLEARED OTHER*	CLEARED ARREST
PART I				
1. Criminal Homicide				
a. Murder & Non. Neg. Mans.				
b. Man. by Negligence				
2. Rape	1	-	-	1
3. Robbery	1	-	-	1
4. Aggravated Assault	16	3	-	8
5. Burg.-Break. & Entry	4	1	-	1
6. Larceny Over \$50.00	19	1	4	5
Under \$50.00	3	-	2	-
7. Auto Theft	44	5	6	16
TOTAL PART I CASES				
PART II				
8. Other Assaults	-	-	-	-
9. Forgery & Counterfeit	1	-	-	-
10. Embezzlement & Fraud	3	1	1	-
11. Stolen Prop: Buy: Receive	-	-	-	-
12. Weapons: Carry: Possessing	-	-	-	-
13. Prostitution	-	-	-	-
14. Sex Offenses	1	-	1	-
15. Offenses Ag. Fam. & Child	-	-	-	-
16. Narcotics	-	-	-	-
17. Liquor Laws	-	-	-	-
18. Drunkenness	-	-	-	-
19. Disorderly Conduct	-	-	-	-
20. Vagrancy	-	-	-	-
21. Gambling	-	-	-	-
22. Drunk Driving	3	-	-	3
23. Viol. Road & Driving Laws:				
Failure to Stop & Identify	3	-	1	-
Speeding	26	-	14	12
Stop Sign	16	-	6	10
Reckless Driving	6	-	-	6

OFFENSES	KNOWN	UNFOUNDED	CLEARED OTHER*	CLEARED ARREST
Right of Way	2	-	-	2
Negligent Driving	9	-	-	9
Defective Equipment	17	-	14	3
Illegal Passing	1	-	-	1
Parking	14	-	8	6
24. All Other Traffic Violations	11	-	6	5
25. All Other Offenses				
26. Vandalism	5	-	3	-
Malicious Mischief	2	-	1	-
Illegal Shooting	2	-	2	-
Public Nuisance	2	-	-	2
Juveniles with Beer	2	-	1	1
Disturbance	5	-	4	-
Bike Violations	1	-	1	-
Molesting	1	-	1	-
27. Suspicion	4	-	1	-
TOTAL PART II CASES	137	1	65	60
PART III				
28. Missing Persons	-	-	-	-
Lost Persons	12	-	12	-
Lost Animals	3	-	-	-
Lost Property	35	-	23	-
29. Found Persons	-	-	-	-
Found Property	33	-	32	-
Found Animals	5	-	-	-
TOTAL PART III CASES	88	-	67	-

<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.		2	-	-	-
32. Prop. Dam. M.V. Accid.		15	-	-	-
33. Other Traffic Accidents		-	-	-	-
34. Public Accidents	)				
35. Home Accidents	)	No Accurate Statistics Kept			
36. Occupational Accidents	)				
37. Firearms Accidents		-	-	-	-
38. Dog Bites		4	-	-	-
39. Suicides		-	-	-	-
40. Suicide Attempts		-	-	-	-
41. Sud. Death & Bod. Found		-	-	-	-
42. Sick Cared For		-	-	-	-
43. Mental Cases		1	-	-	1
TOTAL PART IV CASES		22	-	-	1

COMPOSITE TOTALS

PART I, II, III, IV CASES	291	6	138	77
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Cases listed under "Cleared Other" are those cleared by various means other than arrest, such as: orders from 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.

Property reported stolen	Richland	\$5,881.15
Property recovered	Richland	\$4,212.28

MONTHLY REPORT		RICHLAND POLICE DEPARTMENT										JUVENILES INVOLVED					AUGUST 1955
OFFENSES	NO. CASES	JUVENILES	SEX	10	11	12	13	14	15	16	17						
Robbery	1	2	M	-	-	-	-	1	-	1	-						
Vandalism	2	8	M	2	2	-	2	2	-	-	-						
Illegal Shooting	1	2	M	-	-	1	-	1	-	-	-						
Juv. With Beer	2	6	M	-	-	-	-	-	1	3	2						
Larceny	8	14	M	-	-	1	-	5	-	3	5						
Disturbance	1	1	M	-	-	-	-	-	-	1	-						
Mischief	1	2	M	-	-	-	1	1	-	-	-						
TOTALS	16	35		2	2	2	3	10	1	8	7						

RICHLAND POLICE DEPARTMENT
RICHLAND JUSTICE COURT CASES
AUGUST, 1955

VIOLATIONS	NO. OF CASES		NO. OF CONV.		NO. OF FORF.		CASES CONT.		CASES DISM.		SENT. JAIL	SENT. SUSP.	LIC. REV.	ORIG. PREV. MONTH	BAIL FORF.	FINES	FINES SUSP.
	CASES	CASES	CONV.	NO. OF	NO. OF	NO. OF	CONT.	CASES	CASES	CASES							
DEFECTIVE EQUIPMENT	3	2	2	2	1										\$7.50	\$5.00	\$
IMP DISPLAY VEH LIC	1	1	1	1												2.50	2.50 (1)
INVALID VEH LIC	3	3	3	3												13.50	3.50 (1)
NO DRIVER'S LICENSE	8	7	7	7											6.25	43.50	13.50 (3)
NO CERT. OF REGISTRATION	1	1	1	1												3.00	
INATTENTION TO DRVG	1	1	1	1												10.00	
NEGLIGENT DRVG	9	6	6	6											75.00	127.50	10.00 (1)
HEG DRVG, LIQ INVOLVED	2	1	1	1												35.00	
RECKLESS DRVG	6	4	4	4												155.00	25.00 (1)
RECKLESS DRVG, LIQ INV.	3	3	3	3												302.50	150.00 (2)
DRUNK DRIVING	4	2	2	2							2	2	3			203.50	25.00 (1)
SPEEDING	12	8	8	8											21.50	63.50	
ILLEGAL PARKING	5	3	3	3											7.00	9.50	
ILLEGAL PASSING	1	1	1	1												4.50	
STOP SIGN	13	7	7	7											38.50	38.00	7.50 (2)
FAIL. TO YIELF RGT OF WAY	2	2	2	2												25.00	
FAIL. TO DIM LIGHTS	1	1	1	1											6.25		
PETIT LARCENY	1	1	1	1											100.00		
LARCENY BY CHECK	1	1	1	1													
CREATING A PUBLIC NUISANCE	2	2	2	2											30.00		
PUBLIC INTOXICATION	2	2	2	2											27.50		
2ND DEGREE ASSAULT	1	1	1	1												35.50	
TOTALS	82	53	53	20	6	2	2	2	2	2	2	2	9	5	\$319.50	\$1,077.00	\$237.00 (12)

1 NEG. DRVG. & RECKLESS DRVG & NO DRVR'S LIC - LIC REV. 6 Mos.
1 DRUNK DRIVING - 5 DAYS CNTY JAIL SUSP., LIC REV. 1 YEAR
1 DRUNK DRVG - 5 DYS JAIL SUSP.- LIC SUSP 30 DAYS, LAWYER APPEALED, POSTED \$250 APPEAL BOND.
1 DRUNK DRVG - AMENDED TO RECKLESS DRVG - LIC SUSP 30 DAYS.
1 2ND DEGREE ASSAULT - REDUCED TO ATTEMPTING TO PROVOKE AN ASSAULT.

1 RECKLESS DRVG, LIQ INV. - LIC SUSP 60 DAYS.
1 RECKLESS DRVG - LIC SUSP 90 DAYS.
1 RECKLESS DRVG - LIC REV 6 MOS. PROBATION 6 MOS.
1 RECKLESS DRVG, LIQ INV - LIC SUSP 6 MOS.
1 RECKLESS DRVG - JUVENILE, TO BE HANDLED BY JUVENILE AUTHORITIES
1 RECKLESS DRVG - LIC SUSP 30 DAYS.
1 RECKLESS DRVG - AMENDED TO NEGLIGENT DRIVING

DECLASSIFIED

Design Section

HW-38828

DEL

ORGANIZATION AND PERSONNEL

	July 31			August 31		
	Exempt	Non-Exempt	Total	Exempt	Non-Exempt	Total
<u>Personnel Statistics:</u>						
Design Management	2	1	3	2	1	3
Process Engineering Sub-Section	71	13	84	68	13	81
Design Planning Unit	17	14	31	17	14	31
Design Engineering Sub-Section	82	10	92	78	11	89
Design Drafting Unit	8	82	90	7	82	89
Total Section Personnel	180	120	300	172	121	293
Technical Graduates (Rotational)	-	5	5	-	3	3
Total	180	125	305	172	124	296

Accessions - 3

Separations - 12 - Five engineers transferred to the Atomic Power Equipment Department effective August 31, 1955.

GENERAL

Design Section engineering and drafting manpower effort on Design projects continued to decrease as major programs such as 4-X and Reactor Plant Modifications neared completion. Customer work showed a corresponding increase in terms of Section effort. Distribution was approximately as follows:

	Engineering Man Months Expended	Drafting Man Months Expended	% of Section Effort
Design Development Programs	74.8	15.8	37.6
Design Section Projects	63.9	44.2	43.4
Customer Work & Miscellaneous	22.9	25.4	19.0
	161.6	85.4	100.0

*Equivalent man months expended included 128 hours of engineering and 112 hours of drafting overtime, which represents 0.5% of the Section based on the total available hours for a normal 40 hour week. Major six day work involved Metal Conversion Plant Expansion and 100-K Reactor Plant electrical emergency.

The Design Drafting Unit production for August was 212 new drawings and 443 drawing revisions for an equivalent of five man days per drawing.

DESIGN DEVELOPMENT

Statistics:

The total number of engineering and drafting man months applied to design development activities during August were as follows:

	Engineering		Drafting	
	Man Months	% of Total	Man Months	% of Total
Metallurgical Design Development	3.7	4.9	0.3	1.8
Reactor Design Development	40.1	53.6	6.1	38.6
Separations Design Development	27.4	36.7	9.0	57.0
Chemical Processing & Reduction	1.6	2.1	0.2	1.3
Design Development	2.0	2.7	0.2	1.3
234-5 Development	74.8	100.0	15.8	100.0

COMMERCIAL AND RESIDENTIAL PROPERTY UNIT
COMMUNITY SECTION
August, 1955

PERSONNEL - COMMERCIAL & RESIDENTIAL PROPERTY UNIT:

	<u>Exempt</u>	<u>Non-Exempt</u>
Employees - beginning of month	7	24
Transfers In	0	1
Transfers Out	0	1
New Hires	0	0
Reactivated from Illness Leave	0	1
Terminations	<u>0</u>	<u>0</u>
Employees - end of month	7	25

PERSONNEL - COMMERCIAL AND NONCOMMERCIAL FACILITIES:

	<u>Commercial</u>	<u>Noncommercial</u>	<u>Total</u>
July	1,636	114	1,750
August	<u>1,625</u>	<u>110</u>	<u>1,735</u>
Net Change	-11	-4	-15

SUMMARY OF ROUTINE ITEMS PROCESSED:

	<u>Commercial</u>	<u>Noncommercial</u>	<u>Total</u>
Work Orders	31	2	33
Back Charges	0	0	0
FY Work Orders	54	4	58
FY Back Charges	3	0	3

CONTRACTS AND NEGOTIATIONS:

A. Commercial:

1. Supplemental Agreements:

- a. F. E. Adell, Uptown Tavern - to provide for new rent, separate payments for utilities and services, and incorporation of additional required articles in accordance with lease renegotiation.
- b. Hughes Apparel - to provide for new rent, separate payments for utilities and services, and incorporation of additional required articles in accordance with lease renegotiation.
- c. Richland Motor Company - to provide for subleasing space for use as an insurance agency.
- d. Uptown Thrifty Drug - to provide for a building addition.

2. Business Development:

Eight bids received were opened and read in connection with leasing a plot of land on George Washington Way between Knight Street and Lee Boulevard.

B. Non-Commercial:

1. Supplemental Agreements:

- a. Sacajawea Rifle & Pistol Club - to provide for new rent, a new description of premises and incorporation of additional required articles in accordance with lease renegotiation.
- b. Red Cross - to provide for new rent, separate payments for utilities and services, and incorporation of additional required articles in accordance with lease renegotiation.

GENERAL:

A. Commercial:

1. Walton-Hills Columbia Service Company terminated its lease on the government owned building at 901 George Washington Way, and reopened for business as Walton-Hills Investment Company, Incorporated, in the former Tri-City Herald Building.
2. Bedri J. Saad assigned his lease on the government owned building occupied by the Shoe Salon to the Scott Publishing Company for the operation of a newspaper office.
3. Bruce Johnson's Lucky Five Tavern opened for business in the government owned building located at 615 George Washington Way.
4. G. T. Ford opened a sign painting business in the Maillard Building.
5. The Adjustable Anchor Corporation opened for business in the Diana Langevin Building.
6. Richland Radio and TV terminated its sublease with Paul's, Inc. and reopened in the Richland Investment Company Building in the Uptown Business District.
7. Kloster's Camera Shop terminated its sublease with V & J Partnership and reopened in the Spencer Kirkpatrick Insurance Building.
8. Style Rite Painting & Decorating Co. opened for business.
9. Fission Chips closed business in the McVicker #4 Building.
10. Jane Johnston opened a dance studio under a sublease agreement with the Scott Publishing Company.

B. Non-Commercial:

1. Authorization was received from the A.E.C. to issue site permits to Richland residents which will provide for non-exclusive access to and use of certain waterfront lots for use as private boat moorages.

2. Final inventories of government-owned equipment furnished in connection with the operation of the North Richland Cafeteria and North Richland Branch of the Seattle-First National Bank were executed and distributed.
3. One pasture permit was issued, one was cancelled and three permits were assigned during the reporting period.

COMMERCIAL PROSPECTS:

Inquiries were received during the month concerning the establishment of the following types of enterprises in Richland:

Service Station

Used Car Sales

Pre-School Nursery

SUMMARY OF OCCUPANCY AND EXPANSION STATUS:

A. Commercial	<u>JULY</u>	<u>AUGUST</u>
1. Number of Government-owned Buildings	42	42
a. Number of Businesses operated by Prime Lessees	38	38
(1) Number opened		2
(2) Number closed		2
b. Number of Businesses operated by Sublessees	18	18
(1) Number opened		1
(2) Number closed		1
c. Total Businesses in Government-owned Buildings	56	56
2. Doctors and Dentists in Private Practice	33	33
3. Number of Privately-owned Buildings	80	80
a. Number of Businesses operated by Prime Lessees	48	49
(1) Number opened		2
(2) Number closed		1
b. Number of Businesses operated by Sublessees	*113	115
(1) Number opened		4
(2) Number closed		2
c. Total Businesses in Privately-owned Buildings	<u>*161</u>	<u>164</u>
4. Privately-owned Buildings under Construction	11	10
5. Total Number of Businesses in Operation	*217	220
a. Total openings		9
b. Total closings		6

* Corrected figures

COMMERCIAL & RESIDENTIAL PROPERTY UNIT - COMMUNITY SECTION

August, 1955

B. Non-Commercial:

JULY AUGUST

1. Government-owned Buildings

- a. Churches
- b. Clubs and Organizations
- c. Government Agencies

1	1
5	5
2	2
<hr/> 8	<hr/> 8

Total

2. Privately-owned Buildings

- a. Completed and in Use
- b. Under Construction

11	11
5	5

3. Church Plots and Buildings in Private Ownership

6	6
---	---

4. Pasture Land Permits

99	99
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COMMERCIAL AND RESIDENTIAL PROPERTY UNIT

TENANT RELATIONS

PROGRESS REPORT

	Orders incomplete as of July 31, 1955	Orders issued 7-31 to 8-31	Total orders incomplete as of August 31, 1955
Service orders	782	1995	1161
Work orders	958	409	982
Service charges		245	

Principal work order loads

	Incomplete as of July 31, 1955	Incomplete as of August 31, 1955
Kitchen cabinet linoleum	137	129
Kitchen floor linoleum	96	87
Bathroom tileboard	21	13
Shower stalls	6	2
Laundry trays	14	20

256 alteration permits were issued as compared to 154 issued in July.

Install air conditioner	15	Install automatic washer	47
Install automatic dryer	27	Install additional wiring	2
Install TV antenna	52	Install fence	21
Install patio	6	Install fireplace	1
Install disposal unit	3	Install oil burner	32
Install clothes poles	2	Remove basement partitions	5
Erect small building	3	Install electrical heat	17
Sand floors	2	Install exhaust fan	2
Install driveway	3	Install water softener	2
Install concrete walk	1	Install rear door	4
Install basement partitions	2	Install tile	1
Raise threshold	1	Remove broom closet	1
Change hot water heater	1	Basement excavation	1
Install stoker	1	Install shelves	1

864 inspections were made, as compared to 846 in July.

Alteration permits	34	Basement	2
Bathroom	7	Doors	5
Floors	7	Laundry trays	14
Linoleum	70	Lot lines	79
Range & refer recalls	10	Sink	6
Steps & walks	15	Shower stall	3
Toilet seat	3	Trees	15
Walls	5	Windows	5
Yard	4	Renovation rechecks	54
Dormitories	163	Miscellaneous	10
Cancellations	128	Renovations	115
Shows (new tenants)	110		

COMMERCIAL AND RESIDENTIAL PROPERTY UNIT

TENANT RELATIONS

TENANT STORES

Merchandise Issued

Total Amount

Shades	583
Reflectors	27
Drip trays	9
Ice cube trays	18
Door stops	10
Hydrator glass	3
Meat tender	5
Refer parts	2
Grass seed	2
Cooker pot & cover	5
Caulking compound	1
Furniture delivery	36
Furniture recall	28

RECALL AND DELIVERY OF RANGES AND REFRIGERATORS -- MONTH OF AUGUST

	DELIVERY		RECALLED	
	RANGES	REFERS	RANGES	REFERS
A	4 SC	6 TA	6 SC	8 TA
B	1 SC	1 TA	3 SC	3 TA
F	1 SC		2 SC	1 TA
H		1 TA		1 TA
Q	2 GE		1 GE	1 GE
V	1 GE	1 TA	1 GE	
Y	1 GE	1 TA, 3 GM	1 GE	1 GE, 2 GM
Z	1 GE	1 TA		
1Br.			1 SC	1 GM
2Br.	2 SC	3 TA		3 TA
3Br.	4 SC	3 TA	3 SC	2 TA
Tract			1 SC	1 TA
Total	17	20	19	24

IN WAREHOUSE:

SC ranges -----47
 GE ranges ----- 4
 TA refers 7' -----31
 GM refers 8' ----- 4
 GM refers 6' ----- 2

COMMERCIAL & RESIDENTIAL PROPERTY UNIT
RESIDENTIAL LEASES

AUGUST 1955

DORMITORY REPORT

Dormitories:

	<u>Beds available</u>	<u>Vacant beds</u>	<u>Occupied beds</u>
Men	477	84	393
Women	381*	103**	278*
Total	858*	187**	671*

*This includes 2 beds used for Dormitory offices
**This includes 6 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 16	50 beds
W 15	50 beds
M 7	39 beds

Total beds 139

Released for temporary office use:

W 21	50 beds
W 17	50 beds

Total beds 100

RESIDENTIAL LEASING

<u>CANCELLATIONS</u>		<u>ALLOCATIONS</u>	
Voluntary terminations	35	Houses allocated to new tenants	72
R. O. F.	2	Exchanged houses	6
Discharge	0	Moves (within Richland)	36
Transfers	4	Turnovers (divorce, death, schools)	11
Retirement	1	Wherry house move to GE house	0
Move off project	31	Total leases signed	125
Divorce	1	Total cancellations	130
Death	0	Houses assigned "AS IS"	57
Move to Wherry house	0	Houses sent "Renovation"	53
Military Service	0	Applications pending	667
Not Eligible	3		
Total	77		

RICHLAND HOUSING

HOUSING UTILIZATION AS OF MONTH ENDING HOUSES OCCUPIED BY FAMILY GROUPS

	Conven.	A&J	T	Pre Cut	Ranch	Pre Fab	Dorm Apt.	A&J Apt.	2BR Apt.	Lth Hsg.	Tract	Total
G. E. Employees	2212	266	10	398	874	1117	7	56	59	208	36	5243
Comm. Fac.	101	18	0	25	54	50	0	5	4	8	2	267
AEC	65	28	0	17	41	24	3	3	4	9	2	196
Other Gov't.	11	2	0	0	4	3	0	0	0	0	0	20
Post Office	8	0	0	0	2	8	0	0	0	0	2	20
Schools	65	0	0	6	11	45	0	0	1	1	0	129
Comm. Activities	9	0	0	2	6	5	0	0	0	0	0	22
Med. Facilities	4	16	0	0	1	3	0	0	0	3	0	27
Kaiser Eng.	0	0	0	0	0	0	0	0	0	0	0	0
J. A. Jones	3	3	0	0	2	0	0	0	0	0	0	8
Blaw-Knox	0	0	0	0	1	0	0	0	0	0	0	1
Minor Const.	0	0	0	0	0	1	0	0	0	0	1	2
Not Certified	0	0	0	1	0	3	0	0	0	0	0	4
Total	2478	333	10	449	996	1259	10	64	68	229	43	5939
Ready to Rent	3	0	0	1	0	7	0	0	0	0	0	11
In Renovation	19	0	0	0	4	10	0	0	2	1	0	36
Boarded Up	0	0	0	0	0	0	0	0	0	0	3	3
Total	2500	333	10	450	1000	1276	10	64	70	230	46	5989

	Begin Month	Moved In	Moved Out	End of Month	Difference
Conventional Type	2475	+54	-51	2478	+3
A&J Type	332	+1	-0	333	+1
"T" Type	10	+0	-0	10	0
Precut Type	449	+9	-9	449	0
Ranch Type	998	+12	-14	996	-2
Prefab Type	1261	+40	-42	1259	-2
Dorm Apts.	10	+1	-1	10	0
A&J Apts.	64	+2	-2	64	0
2BR Apts.	70	+0	-2	68	-2
Fourth Housing Tracts	228	+4	-3	229	+1
	44	+0	-1	43	-1
Total	5941	+123	-125	5939	-2

COMMUNITY SECTION
RICHLAND FIRE DEPARTMENT
MONTHLY REPORT

August 1955

Organization and Personnel

	<u>Exempt</u>	<u>Non-Exempt</u>
Employees - Beginning of Month	51	0
Transfers In	0	0
Transfers Out	0	0
Terminations (Retirement)	1	0
New Hires	0	0
End of Month	50	0

Fire Protection

Fire Loss (Estimated): Government	\$ 110.00
Personal	171.00
August Total	\$ 281.00
Year's Total	\$6,650.50

Response to Fire Alarms	18
Investigation of Minor Fires and Incidents	1
Ambulance Responses	17
Inside Schools or Drills	11
Outside Drills	7
Safety Meetings	7
Security Meetings	4
Fire Alarm Boxes Tested	217

On August 2, fire apparatus made a routine standby at the AEC Airport for a plane landing and take-off.

Three Boy Scouts were examined during the month for their Firemanship merit badges.

Underwriters pump tests were run August 8, on Engines 1 and 2. Both trucks easily passed the tests.

Annual pressure test of all fire hose was begun in August and is more than three-fourths complete.

Eight Boy Scouts and their Scoutmaster were shown through No. 2 Station on August 31.

A total of 1,604 residential inspections were completed during August, making a total of 5,336 to date. Every residence in Richland has been called on at least once so that those not inspected represent "not at home," "day sleepers," and "vacant houses". Recalls during September should nearly complete this program started in late March.

Fire Marshal's Monthly Activities

A total of 441 buildings were inspected, resulting in 42 hazard reports being submitted. A total of 483 fire extinguishers were inspected and serviced; 4 installed; 7 removed; 11 recharged; 2 repaired and 2 damaged. In addition, 125 fire hose standpipes and hose boxes were inspected and serviced.

Started preparations for Fire Prevention Week Campaign to be held the week of October 9 to 15. Arranged to have the Chamber of Commerce sponsor the program and conducted a series of meetings for the sponsors. A total of 14,900 pieces of literature has been ordered by the Chamber thus far.

Prepared a visualizer on the Fire Department's Home Inspection program and submitted it to the National Board of Fire Underwriters. Letters from the Underwriters classed our program the best they had seen and asked permission to read the paper at National Conventions in Sun Valley and Omaha next month.

Conducted a class for firemen on Home Inspection practices.

Conducted a successful fire drill at Kadlec Hospital and lectured to 15 fire wardens on their duties.

To show our appreciation for finding all school buildings in excellent condition, caused a group meeting of custodians and school officials where we commended them for their fine work.

Supervised removal of serious weed hazards around 1125 Furniture Warehouses by G. E. Maintenance and private commercial employees.

Supervised the pressurizing of 1171 Area building sprinkler system in an effort to cause hard seating of gaskets and leak stoppage.

Caused four corrections of electrical hazards in private booths at the Atomic Frontier concession row.

Submitted several letters on serious electrical code violations in private church buildings.

COMMUNITY OPERATIONS SUB-SECTION
RICHLAND ELECTRICAL UNIT
MONTHLY REPORT
AUGUST 1955

ORGANIZATION AND PERSONNEL

	<u>Exempt</u>	<u>Non-Exempt</u>
Employees Beginning of Month	<u>5</u>	<u>14</u>
Transfers In	<u> </u>	<u>2</u>
Transfers Out	<u> </u>	<u> </u>
Terminations	<u> </u>	<u> </u>
Total End of Month	<u>5</u>	<u>16</u>

SYSTEM MAINTENANCE AND OPERATION

Outside Lines:

Poles set	<u>4</u>
Poles transferred	<u>15</u>
Anchors installed	<u>4</u>
Guys installed	<u>4</u>
Street lights installed	<u>2</u>
Mast arms installed	<u>2</u>
Street lights relamped - 1100 Area	<u>95</u>
Street lights relamped - 700 Area	<u>0</u>
Flood lights relamped - 1100 Area	<u>4</u>
Flood lights relamped - 700 Area	<u>0</u>
Stack lights relamped - 700 Area	<u>0</u>
Traffic signals relamped	<u>2</u>
Primary line footage added	<u>0</u>
Primary line footage removed	<u>0</u>
Transformer KVA added	<u>75</u>
Transformer KVA removed	<u>62.5</u>
New services installed	<u>3</u>
Services removed	<u>1</u>
Scheduled outages	<u>6</u>
Unscheduled outages	<u>3</u>
Tree trimming	<u>43</u>
Stand by and Escort	<u>2</u>

TRAFFIC SIGNALS

Operational failures	<u>2</u>
Installations	<u>0</u>
Removals	<u>0</u>
Routine check R. R. signal at Van Giesen	<u>4</u>
Total signals in operation - automatic	<u>19</u>
Total signals in operation - manual auxiliary	<u>5</u>
Total signals in operation - flasher	<u>3</u>

RICHLAND ELECTRICAL UNIT

PUBLIC WORKS ELECTRICAL MAINTENANCE

Electrical motors checked and serviced - irrigation	15
Electrical motors checked and serviced - water	41
Electrical motors checked and serviced - sewage	57

FIRE DEPARTMENT TEST AND MAINTENANCE

Inside circuit and equipment checks	4
Outside circuit checks	8
Inside faults repaired	1
New circuits placed in operation	0
Outside faults repaired	6
New boxes placed in operation	0

SUBSTATIONS

Main feeder and tie breaker checks - BB1S1	4
Main feeder and tie breaker checks - BB1S2	4
Secondary and pad located stations - checked jumpers, cutouts, grounds and general condition	25

METERING - OPERATION, MAINTENANCE, CONSUMPTION AND REVENUE

Voltage and load checks	3
Meters tested - customer's requests	1
New meters shop tested	0
Faulty meters replaced or repaired	3
Damaged meters and covers	0
Residential read-ins	215
Residential read-outs	205
Residential disconnects	12
Residential reconnects	12
Radio interference checks	1
Overloaded meters changed out	0
Routine meter tests	129

Consumption and Revenue:

	<u>No. of Meters</u>	<u>KWH</u>	<u>Revenue</u>
Residential - Schedule 1	6,982	4,377,294	\$47,773.33
Commercial - Schedule 2	413	3,434,670	26,115.02
Total	7,395	7,811,964	\$73,888.35

RICHLAND ELECTRICAL UNIT

COMMENTS

STREET LIGHTING:

The usual routine relamping and circuit checks were performed during the month. Twelve wire screens were installed to provide guards to lights in Columbia Play Field. This installation is a test one and will be succeeded by about 40 more if found adequate.

New mercury vapor lights were installed at 2 locations on Van Giesen west of Wright to provide more adequate lighting to this arterial in this area.

TRAFFIC SIGNAL SYSTEM:

Overhauled battery bank to Railroad crossing signal system at Van Giesen and Bypass.

Retime traffic signals at George Washington Way and Symons with signals at George Washington Way and Williams for 25 MPH.

Made all routine maintenance and operational checks on all traffic and railroad signals during the month.

Reset traffic signals at Lee & George Washington Way and Knight & George Washington Way to handle traffic during Atomic Frontier Days celebration. Installed additional timing trippers to signal at Goethals & Mansfield to handle evening traffic from parking areas in vicinity.

Changed out defective flasher unit at Stevens & Symons.

Installed special switch to traffic controller at Goethals & MacKenzie to provide for weekend lockout, for flasher operation.

FIRE PROTECTION SYSTEM:

Repaired fire alarm circuit near W-20 Bldg. broken by Transportation fork-lift.

Overhauled and exchanged fire alarm recorders at Central Fire Station, Police Station and Fire Stations 1 and 2.

Repaired open circuit to #10 repeater circuit at Central Fire Station.

Performed routine tests to alarm equipment at Desert Inn Hotel, Medical-Dental Bldg. and W Dorms.

Performed routine tests to Battery banks and fire alarm equipment at Central Fire Station.

Replaced broken pipe insulator to alarm box at Thayer & Longfitt.

Cleaned and checked all alarm boxes on Circuit # 4.

Trimmed trees on 40 locations on Circuit # 1, to remove grounded condition.

WATER SYSTEM:

Performed routine inspection of motors and controls on domestic water system.

Performed routine inspection and servicing of motors and controls to 3000 area water system.

Replaced defective motor bearing to #2 motor at well house #5.

Repaired chlorinator motor to water supply at City Park.

Performed routine inspection of all irrigation pump motors and controls.

RICHLAND ELECTRICAL UNIT

SEWAGE TREATMENT AND DISPOSAL SYSTEM:

Performed routine checks to electrical equipment to all sewer lift stations, and main sewage Plant.

Overhauled 3 hp sewage recirculation motor at #1 Plant.

Overhauled 5 hp Humus pump motor at #2 Sewage Plant.

Rewired control switches to two 60 hp recirculation pump motors at #2 Plant House - sewage disposal.

Checked and relamped all buildings connected with sewage system.

GENERAL COMMUNITY ELECTRICAL MAINTENANCE:

Installed temporary meter for use at Concession Row at Riverside Park.

Performed routine maintenance and relamped Public Library.

Repaired and restored electrical service to 1309 Stevens where Community Maintenance crew felled tree on tenant's service.

Disconnected paint bus at Stevens & Van Giesen.

Disconnected residence at 1105 Acacia for heating installation.

Performed routine relamping on all Community public works, Parks and Commercial installations as required.

Repaired electrical router tool for Community carpenter shop.

MAINTENANCE AND OVERHAUL - OUTSIDE LINES AND STATIONS:

Outage to Station D1-S34 to clean high voltage bushings and check wiring and transformers.

Performed shop overhaul to 13 distribution transformers.

Outage to Station D1-S18 to perform general station overhaul.

Repaired loose neutral causing high voltage to tenant 1518 Hunt.

Arranged 2 primary outages to Parochial School on Long Ave. for contractor to complete work on high voltage service to transformer vault.

Inspected and serviced the 7200 volt portion of BB1S1 and BB1S2 Main Richland Power stations.

Intermittent progress is being made on distribution rebuild program being performed in the vicinity of Sanford and Duportail due to amount of other scheduled work for unit line crew.

Replaced corroded service wires at 1927 Hood due to poor installation by contractor.

Repaired service insulators at 1125 Thayer.

Repaired service insulators at 1518 Van Giesen.

Repaired broken service connection to TV amplifier at 1107 Williams.

Installed 400 ft. 6 pr lead cable at Armistead and Comstock for Telephone Section.

Installed 5400 ft. rural type telephone cable between George Washington Way and New Ferry Landing on Work Order from Telephone Section.

Provided disconnection service to tenant at 1506 Birch to make residential heating installation.

Connected service to new commercial tenant at Glass & Paint Shop near Gillespie and Duane.

Connected permanent service and removed construction service to new Conoco Station at Knight & Stevens.

Disconnected and removed service to Tract house 01224, south of Columbia Club, which is to be exccessed.

Ten customers were disconnected for non-payment during the month. All were reconnected after payment.

1

RICHLAND ELECTRICAL UNIT

ESCORTS:

Two high load escorts were made for the Transportation Unit during the month.

PLANNED OUTAGES:

There were six planned outages during the month. Of these, two were for distribution line rebuilding, two were for cleaning and overhauling power stations and two were to permit contractor to complete installation work to Parochial School transformer supply service.

UNSCHEDULED OUTAGES:

Callout to replace transformer fuse to Standard oil bulk plant. A later call to replace defective transformer at same location was necessary.
Callout to repair broken primary wire on Fries Street where splice failed.
A total of eight weekly men were called out during the month.

COMMUNITY OPERATIONS SUB-SECTION
ENGINEERING UNIT
MONTHLY REPORT
AUGUST 1955

<u>PERSONNEL:</u>	<u>Exempt</u>	<u>Non-Exempt</u>	<u>Total</u>
Employees Beginning of Month	7	4	11
Transfers Out	0	0	0
Transfers In	0	0	0
Terminations	0	0	0
Total End of Month	7	4	11

BUILDING PERMITS ISSUED IN AUGUST

1. R. L. McGahee - 1824 Howell Ave. - Wood Frame Cover for Patio
2. R. G. Norman - 910 Sanford - Wood Frame Garage
3. Joe N. Nye - 503 Basswood - Patio
4. Davis Furniture - 1341 Geo. Wash. Way - Alterations
5. 5 Sign Permits

NEW MUNICIPAL CONSTRUCTION STARTED IN AUGUST

Engineering Work in Connection with Installation of Blacktop on Project
Work in 300 Area

NEW PRIVATE CONSTRUCTION STARTED IN AUGUST

R. L. McGahee - 1824 Howell Ave. - Wood Frame Cover for Patio
R. G. Norman - 910 Sanford - Wood Frame Garage
Joe N. Nye - 503 Basswood - Patio
Davis Furniture - 1341 Geo. Wash. Way - Alterations

PRIVATE CONSTRUCTION COMPLETED IN AUGUST, OR ON WHICH FINAL INSPECTION MADE

Desert Inn Swimming Pool

ENGINEERING JOBS COMPLETED IN AUGUST

NONE

STATUS OF ENGINEERING UNIT PROJECTS

- G-01009 - Knight Street Improvement - Construction 97% complete. Landscaping yet to be completed.
- G-01010 - Extension Torbett West of Perkins Avenue - Construction 95% complete. Landscaping yet to be completed.

STATUS OF ENGINEERING UNIT PROJECTS (Cont.)

- G-01012 - Boise Street Extension - Construction 95% complete. Landscaping yet to be completed.
- G-01015 - Water Service to Commercial Users (7 locations) - One service to be completed. 90% complete. No progress this month.
- G-01018 - Relocation of 20" Meter at 3000-F Well - Contract award made 6-28-55. Materials on order. No construction started.
- G-01019 - Water Meter & Check Valve, No. Richland - Design delayed for further study of conditions.
- G-02171 - Automatic Bar Screens Sewage Lift Station - Construction to start upon receipt of equipment, estimated to be Sept. 12, 1955.
- G-02176 - Comfort Station, Sewage Lift Station - Chlorination Station, Riverside Park - Construction 85% complete. Awaiting delivery of fixtures.
- G-02193 - Development Riverside Park - North of Lee Boulevard - Contract work 80% complete. Work progressing normally.
- G-02197 - Water Meter Installation for 300 Area Supply Lines - Materials on order. No construction started.
- G-03628 - Van Giesen Street Improvements (G.W.W. to Hunt Ave.)-Construction 97% complete. Landscaping to be completed.
- G-03629 - Replacement of Thin Wall Steel Water Lines (FY 1955) - Construction 2% complete. Awaiting arrival of pipe and appurtenances.

STATUS OF ACTIVE ENGINEERING WORK ORDERS

- C-0572 - Study of Drainage Ditch from Swift Blvd. to Origin on Wellsian Way - 80% complete. Design delayed for pressing construction work.
- C-0578 - Water and Sewer Line to Property on Gillespie - 99% complete. Physical completion notice to be issued.
- C-111460 - Plat and Legal Description Christian Science Society - 75% complete.
- C-111461 - Revise Legal Description of 11 Churches - 80% complete.
- C-81020 - "As Built" - Phase III - 76% complete. Work progressing rapidly.
- C-81384 - Plot Lot Lines on Utility Drawings from Plats of Richland - 75% complete. Work progressing rapidly.
- C-81578 - Basin Located West of No. Richland Recharge Basin - Design 90% complete. To A.E.C. for review 8-26-55.
- C-81591 - Engineering Work in Connection with Installation of Blacktop on Project Work in 300 Area - Construction 90% complete.
- C-95450 - Replace Lot Line Corner Stakes - an open active file.

STATUS OF ACTIVE ENGINEERING WORK ORDERS (Cont.)

- C-98001 - Extending Sewer to Vacant Lot, "Rose Garden" - 95% complete.
- C-98020 - Plat and Legal Description - Vacant Lot So. of Morgan's Warehouse - 50% complete.
- I-90914 - Utility Lines, Legal Descriptions and Diagrams for Churches - 90% complete.
- I-91014 - Retirement of Separate Irrigation System - Design 85% complete.
- I-91024 - Retirement of Irrigation Canal - Design 75% complete. Delayed by more pressing work.

BUILDINGS UNDER CONSTRUCTION

- Assembly of God Church - 99% complete. No progress this month. Fire inspection made and report issued.
- First Baptist Church (Richmond and Raleigh Sts.) - 92% complete. No progress this month.
- Television Antennae - an open active file. No permits being issued.
- Plans, Specs., Inspections, Church of Nazarene Addition - 99% complete. Final inspection to be made.
- Plans, Specs., Inspections, Christ of King Parish (Catholic) - Construction materially complete and buildings partially occupied.
- Addition to Uptown Thrifty Drug Store - Materially complete. Final inspection to be made.
- Plans, Specs., Inspections, Uptown Thrifty Drug Store Rehabilitation - Final inspection to be made.
- Plans, Specs., Inspections, Tide Water Associated Oil - Final inspection to be made.
- Plans, Specs., Inspections, Colin Bleiler Service Station - 99% complete. Final inspection to be made.
- Plans, Specs., Inspections, Continental Oil Company - 85% complete.
- Plans, Specs., Inspections, Tim's Drive In - Final inspection to be made. Open for business.
- Plans, Specs., Inspections, L. G. Cook Building - 60% complete. Work progressing slowly.
- Plans, Specs., Inspections, Johnny's Drive In Farmers Market - 40% complete. Work progressing slowly.
- Plans, Specs., Inspections, Shell Oil Company Service Station - Final inspection to be made.

BUILDINGS UNDER CONSTRUCTION (Cont.)

Plans, Specs., Inspections, Style-Rite Painting and Decorating - 99% complete.
Final inspection to be made.

Plans, Specs., Inspections, Parker Hanson Building - Construction 20% complete.

Plans, Specs., Inspections, All Saints Episcopal Church Addition - Plans
received for review.

Plans, Specs., Inspections, Alteration to Davis Furniture Company - 75%
complete.

COMMUNITY OPERATIONS SUB-SECTION
PUBLIC WORKS AND RECREATION UNIT
MONTHLY REPORT
AUGUST 1955

<u>ORGANIZATION AND PERSONNEL</u>	<u>Exempt</u>	<u>Non-Exempt</u>
Employees Beginning of Month	7	54
Transfers Out	0	5
Transfers In	0	6
New Employees	0	0
Terminations	0	6
Total End of Month	7	49

ROADS AND STREETS

Pavement was replaced on Willard Avenue at the location where 160 lineal feet of storm sewer were installed from Swift Blvd. north to allow for a catch basin to drain a low area on Willard Avenue.

Existing pavement on Wellsian Way fronting the new filling station constructed at the corner of Wellsian Way and Lee Blvd., was widened towards the east to meet a new curb and gutter installed by the filling station contractor so that paved access would be provided to the filling station and surface water would be carried to the south.

Asphaltic gutters were re-layed in the 1100, 1200, 1300 and 1400 blocks on Swift Blvd.

The program of patching out parking lot service drives at the same time that the streets in the vicinity are being patched was continued with the concurrence of the Maintenance and Renovations Unit, and efficient results are being obtained in this program.

Construction work, with the exception of some minor hand grading and clean up and re-seeding of disturbed lawn areas, has been completed on the 1955 Street Improvement Program which included development of Van Giesen Street between George Washington Way and Hunt, the extension of Torbett and Boise Streets, and the addition of one (1) traffic lane on Knight Street between Goethals Drive and the Police Station.

Routine seasonal maintenance was continued on streets, parking lots, drainage systems, and street marker and traffic control signs.

SANITATION

Collection of waste material was continued according to schedule and a total of 1199 tons of waste were collected and disposed of during the month.

PUBLIC WORKS AND RECREATION UNIT

SANITATION (contd.)

Efforts directed at reducing the number of trash trailers utilized in the commercial areas has been continued and the total number of trash trailers now in service is 25. Over the past period of one and a half years ($1\frac{1}{2}$) the total number has been reduced from 65 to the present total of 25 trailers.

PARKS AND PUBLIC GROUNDS

Construction work on the development of six additional acres of Riverside Park on the north side of Lee Blvd. was continued and this project is now approximately 85% completed. During the month finish grading, fertilizing, and grass seeding were completed, and work yet remaining to be done includes the setting of 84 trees, the lowering to grade of irrigation risers, and the application of asphaltic oil to the parking lots and drive.

Construction work on the new Comfort Station at Riverside Park is now complete with very minor exceptions and the building will be placed in service over the Labor Day holidays.

Four softball fields were placed in top condition for play during the Washington State Softball Tournament which was held here during the latter part of August.

Routine maintenance was continued on Parks grounds and buildings, shelter-belts and public areas, and other lawn grass areas assigned to the care of this group.

MOSQUITO CONTROL

Evaluation of Mosquito Control success during August, based on the number of complaints received, indicates that this has been the most successful period of the season. The sharp decrease in adult mosquito population is due to control activities, the return of the Columbia and Yakima Rivers to normal elevations thus allowing flooded areas to dry out, and a certain amount of aerial spraying done by neighboring communities thus reducing the number of adult mosquitos blown into Richland.

Larvaciding of standing water areas and fogging to control the number of adult mosquitos is being continued in an attempt to hold the mosquito population at its present low level.

The following materials were used during August:

- 1050 gallons of Diesel Oil
- 300 pounds DDT
- 75 gallons of Xylene
- 20 gallons of Lethane

PUBLIC WORKS AND RECREATION UNIT

RECREATION

General

The Doll Show, a special event of the Summer Recreation Program, was held at Riverside Park on Wednesday, August 10 at 2:30 P.M.

The Atomic Frontier Days Hobby Show was held at the Community House Games Room on August 11, 12, and 13.

The Atomic Frontier Days Talent Show was held at the Riverside Park bandstand on Friday, August 12 at 8:00 P.M.

The Richland City Softball Tournament and the District Tournament to qualify teams for the State Tournament, were held at Memorial Softball Field during the weeks of August 8-12 and August 15-18 respectively. The Washington State Softball Tournament was held on August 25-28 inclusive, and four Richland softball fields were utilized continuously during this tournament.

The final concert for the season in a series of Summer Community Band Concerts was held at Riverside Park bandstand on Thursday, August 18 at 7:45 P.M.

The Junior Olympics, last of the special events of the Summer Recreation Program, were held at Riverside Park on Wednesday, August 24 at 2:30 P.M.

The Summer Recreation Program of activities at Riverside Park and Columbia Playfield came to a close on Friday, August 26.

Attendance Statistics - August 1955

	<u>No. of Sessions</u>	<u>Youth</u>	<u>Adults</u>	<u>Sub Total</u>
A. <u>Community House</u>				
American Red Cross	1		175	175
Arts and Crafts Class	8	243	8	251
Bowling League	1	15	10	25
Boy Scouts	3	23	12	35
Boys of Woodcraft	2	26	3	29
Business Women's Bowling League	1		25	25
City Council	2		63	63
Columbia Sports Officials	1		25	25
Games	24	1005	143	1148
Hi Spot	8	2732	20	2752
Hobby Show	4	400	1020	1420
Housewife's Bowling League	1	1	41	42
Intermediate Bowling League	1		30	30

PUBLIC WORKS AND RECREATION UNIT

Attendance Statistics - August 1955 (contd.)

	<u>No. of Sessions</u>	<u>Youth</u>	<u>Adults</u>	<u>Sub Total</u>
Jaycees	1		50	50
Laundry Workers Union	1		30	30
Major Bowling League	1		20	20
Rec-A-Teers	4		558	558
Richland Rod & Gun Club	1	15	140	155
Social Security	2		76	76
Softball Association	5		391	391
Stamp Clubs	2	2	15	17
Tenderfoot Bowling League	1		27	27
Umpires' Association	1		11	11
YWCA Bridge Club	1		4	4
Total Community House	76	4 462	2 897	7 359
B. <u>Parks and Playgrounds</u>				
Columbia Hardball Field	25	1 300	1 100	2 400
Triple-O-League	2	25	250	275
Play-For-Fun-League	6	450	110	560
Wellsian Lake	31	1 600	200	1 800
All Playgrounds	360	10 800	500	11 300
Memorial Softball Field	15	750	1 700	2 450
Scheduled Picnics	40	850	1 180	2 030
Doll Show	1	43	95	138
Junior Olympics	1	27	38	65
Practice Field Bookings	60	510	315	825
Riverside Park	20	7 340	3 800	11 140
Columbia (Playfield Lights)	20	2 011	3 760	5 771
State Softball Tournament	50	2 500	6 400	8 900
Atomic Frontier Days	3	6 000	5 000	11 000
Total Parks and Playgrounds	634	34 206	24 448	58 654
C. <u>Summary</u>				
Community House and Parks and Playgrounds total for August 1955	<u>710</u>	<u>38 668</u>	<u>27 345</u>	<u>66 013</u>
Calendar Year to Date				<u>267 383</u>

COMMUNITY OPERATIONS SUB-SECTION
WATER AND SEWERAGE UTILITIES UNIT
MONTHLY REPORT
AUGUST 1955

ORGANIZATION AND PERSONNEL

	<u>Exempt</u>	<u>Non-Exempt</u>
Employees beginning of Month	5	21
Transfers Out	0	0
Transfers In	0	0
New Employees	0	2
Terminations	0	1
Total End of Month	5	22

DOMESTIC WATER

Normal operations were continued. Water supply has been sufficient to meet the demand and maintain adequate pressure on the system throughout the month.

The south half of 3000 Area percolation basin was cleaned by removing approximately six inches of material from the entire surface. Water was returned to this basin in August. Other routine minor maintenance and repairs to water system equipment have been continued throughout the month.

Water meters were installed at the following locations during the month:

South Side United Protestant Church	517 Goethals
Christ the King (Parochical) School	1103 Putman

DOMESTIC WATER DATA

	<u>Well Production</u>	<u>Av. Da. Prod.</u>	<u>Total Consumpt.</u>	<u>Av. Da. Cons.</u>
Richland	208,620,000	6,729,600	727,647,700	23,472,500
North Richland	528,600,000	17,051,600	55,342,000	1,785,000
Columbia Field	121,792,600	3,928,700		
300 Area			76,821,000	2,478,000
Total	859,012,600	27,709,900	859,810,700	27,735,500

Maximum daily production 30,134,600 gallons on August 9, 1955

Maximum daily consumption 30,581,000 gallons on August 11, 1955

WATER AND SEWERAGE UTILITIES UNIT

SEWERAGE SYSTEM

Normal operations and routine minor maintenance and repairs were continued. Approximately 90,000 gallons of sludge was pumped to the drying beds.

SEWAGE DATA

Plant No. 1 Total Flow	41,010,000	Average Daily Flow	1,322,900
Plant No. 2 Total Flow	97,399,000	Average Daily Flow	3,141,900
Total Flow	<u>138,409,000</u>		<u>4,464,800</u>

IRRIGATION SYSTEM

Normal operations and routine maintenance continued. Four, ton Cylinders of Chlorine were fed into the canal system for aquatic weed control.

COMMUNITY OPERATIONS SUB-SECTION
RICHLAND PUBLIC LIBRARY
MONTHLY REPORT
AUGUST 1955

<u>ORGANIZATION AND PERSONNEL</u>	<u>EXEMPT</u>	<u>NON-EXEMPT</u>
Employees Beginning of Month	3	9
Transfers In	0	0
Transfers Out	0	0
New Hires	1	0
Terminations	0	1
End of Month	4	8

GENERAL

Circulation

Books	18,161
Magazines	471
Pamphlets	69
Records	1,383
Inter-Library Loans	18
Grand Total	20,102

Current Book Stock

Books added this month	333
Books withdrawn this month	0
Grand Total	35,552

Phonograph records added	0
Phonograph records withdrawn	0

Registration

Adult	128
Juvenile	43
Grand Total	171

Total Registered Borrowers	19,916
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Meetings in North Hall	5
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Miss Marie Golubski from Grand Rapids, Michigan joined the library staff as Children's Librarian on August 29. Miss Golubski is a graduate of Rosary College, River Forest, Illinois and of the University of Michigan.

AUXILIARY OPERATIONS AND PLANT PROTECTION SECTION

MONTHLY REPORT - AUGUST 1955

ORGANIZATION AND PERSONNEL

Number of employees on payroll:

	<u>Beginning of Month</u>	<u>End of Month</u>	<u>Increase</u>	<u>Decrease</u>
Staff	2	2		
Administration Area Maintenance	105	103		2 (a)
Security and Patrol	473	472		1 (b)
Fire Protection	134	133		1 (c)
Office Auxiliaries	124	122		2 (d)
Telephone	84	84		
	<hr/>	<hr/>	<hr/>	<hr/>
TOTALS	922	916	-	6

NET DECREASE: 6

(a) - Administration Area Maintenance

- 1 - Transferred out
- 1 - Termination

(b) - Security and Patrol

- 1 - Reactivated
- 2 - Terminations

(c) - Fire Protection

- 1 - Transferred out

(d) - Office Auxiliaries

- 16 - New Hires
- 1 - Transferred in
- 15 - Transferred out
- 1 - Deactivated
- 3 - Terminations

FIRE PROTECTION UNIT

Fire Responses

HAPO	10	Loss	\$ 2,500.00 (Estimated) 10.00
U. S. Army	1	Loss	-----
<hr/>			<hr/>
TOTALS	11		\$ 2,510.00

Drills Held During August

Outside Drills held	107
Inside Drills held	141

22,550 feet of fire hose and 1,198 feet of ladders were used for drill purposes during August.

Fire Protection Unit officers held two artificial respiration classes and two Chemox mask classes for a total attendance of 43 people of various departments.

Fire Extinguishers

Inspected	1,724
Installed	9
Delivered to new locations	3
Seals broken	30
Serviced	200
Weighed	592

Gas Masks

Inspected	44
Serviced	14

OFFICE AUXILIARIES SUB-SECTION

Plant Mail Unit

Interoffice mail increased slightly during the past period. Postal mail showed a slight decrease in regular mail but Registered, Certified and Special Delivery increased. Special assignments included the preparation for mailing and distribution of the Secretarial Information and the Organization Directory. Four separate preparations for mailing jobs for Union Relations and one for Personnel Practices, as well as the distribution of the Annual Rating Sheets plus the routine Health Bulletins, News Letters, G.E. Monogram, forty-two Organization and Policy Guides, etc.

Plant Mail Unit (Contin)

Mail schedules are in the process of revision in the 700-1100 Area and the mail boards retyped.

The new mailboard was completed and installed in 100-D Area thus completing the standardization of all Plant Mail equipment.

Employee Location and Distribution Files were all brought up-to-date and revised during the past month with nomenclature changes on the Addressograph plates to match the new Organization Directory.

The Registered Mail Room was moved from the south end of the addressograph room making space for the new addressograph equipment on order.

Two new files were added to Addressograph, one Secretarial File for Records Unit consisting of three-hundred and eighty plates and one for R.M.U. of eighteen hundred plates.

The O.P.G. File was completely revised to allow single copy distribution to those who need only one copy. 275 new plates at a cost of \$.20 per plate were prepared to accomplish this, or \$55.00. Estimated savings of \$2880.00 annually in Duplicating, drilling, collating, and paper costs are expected, based on the past six months volume.

<u>Types and Pieces of Mail Handled</u>	<u>July</u>	<u>August</u>
Internal	4,445,923	4,641,194
Postal	79,892	78,252
Special	2,020	2,046
Registered	7,662	9,532
	<hr/>	<hr/>
	4,535,497	4,731,024
Total postate used	\$2,911.14	\$2,767.54
Total teletypes handled	3,082	3,051
Total store orders handled	498	488

<u>Addressograph</u>	<u>July</u>		<u>August</u>	
	<u>Number of runs</u>	<u>Total Copies</u>	<u>Number of runs</u>	<u>Total Copies</u>
Plate name list	121	158,006	120	161,030
Housing List	14	46,261	14	48,693
Payroll List	7	19,122	5	18,600
Total new plates	4,167		3,969	
Total corrected plates	5,943		2,186	
	<hr/>		<hr/>	
	10,110		6,155	

Printing Unit

On August 18, a representative of Remington Rand Inc., demonstrated their new presensitized photographic paper plates for the Model 1250 Multilith. Their plates produce a satisfactory half-tone image. Further information and samples have been requested which will fit the "Chief 22 press". Such a plate would be desirable for the large press to print formal reports and other data of a Secret or Confidential category. These paper plates can be destroyed by burning along with other classified paper scrap and eliminate the slow and costly procedure of destroying the presently used metal plates by burning, with Security personnel in attendance.

An unusually large number (62) of formal reports were printed during August. The largest one was for 55 originals, requiring 150 copies each.

Other orders of significance which were printed during the month were: one Top Secret order for AEC, the plant Organization Directory, Uniform Filing System Index for Records Center, Revised Pension and Insurance Plan and 1st, 2nd, 3rd prize - Personnel Meter Posters.

<u>Work Completed</u>	<u>July</u>	<u>August</u>
Orders Received	407	355
Orders Completed	387	349
Average Orders on Hand	53.4	58.4
Copies Printed	1,361,156	903,110
Negatives masked	422	736
Negatives Processed	522	730
Photo Copy Prepared	202	469
Litho Plates Processed	594	811

Stenographic Unit

Nine Stenographer-Typists and four Stenographers were assigned to the Stenographic Unit during August. Fourteen permanent transfers were made to other plant units and twenty-seven temporary assignments were made. Due to slackening of vacations, fewer requests were received for vacation relief assignments, allowing more time for training new employees.

The work load was fairly consistent throughout the month and included a number of larger assignments for Wage Rates, Employee Services, Manufacturing-Engineering, Separations, General Accounting and Weekly Payroll. Ninety-one assignments were received and completed against 53 cost codes. All deadlines were met and work is current at month's end.

	<u>July</u>	<u>August</u>
Total Production Hours	4,057.5	2,249
Training Hours	681.5	744
Unassigned Hours	171.5	79
Holiday Hours	37.5	---
Meeting Hours	80	4.5
Absentee Hours	16	0
	<hr/>	<hr/>
	5,044.0	3,076.5

Duplicating Unit

During the month, new Xerography cameras and fusers were installed in each Duplicating Unit office and tested by Haloid Company representatives. This completes the replacement of equipment formerly rented from Haloid Company, with the new units recently purchased. One New Model D Xerography processor was installed in Central Duplicating, 703 Building. This processor incorporates new design features which will permit the reproduction of multiple copies of good quality from one plate exposure.

On August 18, a new Embosograf work cabinet was installed in the Duplicating office, 760 Building. The cabinet was designed and fabricated in order to provide more efficient layout space for Embosograf work, and additional storage space for supplies.

Arrangements were made with the Separations Section landlord which permitted the renovation and enlargement of lounge facilities in the 2705-Z Building used by Duplicating Unit and Plant Mail Unit personnel at that location.

Number of copies duplicated exceeded one million for the period reported. Cost per hundred copies duplicated for the month of July 1955 was \$1.46. This figure is lower than at any time since August 1953.

	<u>July</u>	<u>August</u>
Orders Received	3,269	3,497
Orders Completed	3,199	3,347
Orders on Hand	170	201
Offset Plates	13,798	16,637
Offset Copies	995,868	1,010,564
Verifax Masters	4,949	2,959
Verifax Copies	13,127	8,963
Ditto Masters	457	554
Ditto Copies	9,793	9,778
Zerox Plates	1,301	1,897
Ozalid Masters	41	10
Ozalid Copies	300	55
Embosograph Orders	35	2
Embosograph Copies	315	13
Number of copies duplicated	1,019,403	1,029,373

Office Equipment Unit

Office Furniture

The expendable office furniture inventory account 93 was valued at \$9,729.00 on July 31, 1955, or an average of 1.9 month supply on hand. Withdrawals for the month was \$1,567.00 with \$2,722.00 received into the account.

The following is a detail of pieces of furniture handled during the month:

<u>Item</u>	<u>Issued</u>	<u>Received</u>	<u>Salvage</u>
Bookcase	6	0	0
Blackboard	2	0	0
Cabinet	107	61	1
Card File	13	4	0
Costumer	16	10	0
Chairs	145	79	0
Desk	84	51	0
Table	56	24	0
Miscellaneous	403	81	1

Office Equipment Unit (Contin)

A total of 136 service orders were issued to cover cost of minor repairs of office furniture and repair of file cabinet locks during the month.

The work order issued to repair all Harder Steno Chairs which required reinforcement of base cross section is approximately 30% completed. Ten percent of the chairs repaired have metal checks which would cause chairs to collapse within a short period of time.

There were a total of 574 debit and credit store orders processed during the month. This is an average of 26 orders per working day.

Library furniture has been ordered to furnish a renovated vault in 703 Building, which will be used jointly by the AEC and GE Legal Staff.

In an effort to improve the standard of swivel chairs now in use, a requisition has been issued to cover 5 different manufactured chairs ranging in price from \$68.00 to \$95.00. These chairs will be evaluated on wearing qualities, comfort, size, and cost to determine the type of chair that will best serve our purpose at HAPO.

Office Machines

The total number of machines in service and stock as of the 20th of August, was 4,297, or a net reduction of only one machine over the previous month.

The Macy Collating Machine was received and will be installed in the 703 Building during the month of September.

Ten printing type Calculators were received and assigned to locations performing routine addition, subtraction, division, and multiplication problems. Ten adding machines and ten rotary type calculators were picked up for reassignment as a result of the issuance of these printing calculators.

The reconciliation with Office Machines inventory records and Plant Account records has been completed. Plant accounts will adjust their records to coincide with inventories and a report of discrepancies will be made by that unit.

Office Machine Repair Unit

The volume of office machine repair calls increased over June and July. The increase was of a general nature and has no particular significance.

Four new attendance and time recorders were installed at the 700 Area North Gate House to replace four older clocks. The older clocks will be reconditioned for issuance to Minor Construction Forces for field use.

Repair tickets processed were as follows:

<u>July</u>	<u>August</u>
557	671

ADMINISTRATION AREA MAINTENANCE SUB-SECTION

Property Disposal reports have been processed to provide for sale and removal of Knight Street Hutments and the overhead steam line which serves them.

Nine office moves were made in August.

Two Hauserman partition installations were made in 700 Area and two sections were removed. Partition stock was provided for one installation in the 300 Area. It has been necessary to defer a number of requested installations because of lack of adequate stock. Parts shipment is being expedited and bids are now being obtained on additional partitioning to replace depleted stocks.

Temporary blacktop walks were installed to connect new plant telephone exchange to other buildings in the area.

Steam Plant distribution line drawing and data on connected outlets were submitted informally to AEC .

Digging permits were issued and water line maps were reviewed with the AEC in connection with contract to enlarge 712 Records Center.

General Maintenance

Hot air furnaces at Transportation Building are being completely overhauled by our craftsmen, under direction of Ross Engineering field maintenance superintendent. The heat tubes were warped and split from last winter's operation. All burners are being cleaned and considerable brick work is being replaced. After maintenance work is completed, Ross Engineering will check and balance air flow and put entire unit into condition for winter operation. Work is being closely coordinated with AEC personnel. Work is approximately 30% complete.

Refrigeration piping was revised and Trane units were overhauled at 713 Building.

The overhaul of Number 4 boiler at 784 Steam Plant was completed.

Overhaul of steam turbine for Number 2 boiler feed pump was also completed.

Rerouting of steam line along the south side of 713 Building has been completed. This line serves IBM equipment and air conditioning.

Safety relief valves on 700 Area buildings were tested and set for proper operation.

Unit heaters and other needed steam heating equipment were removed from Knight Street hutments after they were vacated by Community Section.

A new glass washer was installed in laboratory at Kadlec Hospital.

Four of the twelve desert coolers on 761-762 Buildings were replaced with larger "Comfort Air" coolers. The remaining eight will later be replaced in the same manner.

Three coolers were installed on 716 Building.

General Maintenance (Contin)

Window screens were installed on upper windows of 703 Building third wing to prevent roosting and nesting of pigeons.

Breather holes were cut in metal clad fire doors at 702-B Building for escape of pressure in event of a fire.

Metal shade was installed on 713 Building dock to protect cylinders from afternoon sun.

Two electrical fork lift trucks for Central Stores were completely overhauled and rebuilt, and contacts were installed. Other trucks will be repaired as time permits.

Six hot plates were repaired at Bio-Assay Laboratory. Thermostat and two fixtures were also installed in this building.

Motors were installed on Multilith machines at 717 Building.

Motor generator set for telephone system at 702 Building was overhauled.

Repairs were made to air raid siren.

Kim-start circuits and cords at 1171 Building are being readied for winter service; 20 cords have been rebuilt.

An alarm horn was installed at 784 Heating Plant, tying in with IBM temperature controls at 713 Building, to give warning during off shifts when temperatures exceed control limits.

A warning light was also installed at hospital nurses' station to signal poor temperature conditions in OB wing.

Repairs were made to elevator at Meteorological Tower.

An additional air cooler was installed in north attic of 770-A.

Numerous miscellaneous jobs of wiring installation and repair were performed, including relocating and hanging of light fixtures.

Lock work was of a routine nature, consisting of opening vaults and files, repairing locks and safes, re-keying and repairing door locks.

Carpenters removed approximately 1,500 feet of fence along Knight Street hutments to clear way for water line installation and excessing of hutments.

Several Hauserman partitions were relocated and 16 feet of new office wall was installed.

A glazier installed 35 units for Real Estate, expending 40 hours for Manufacturing and only eight hours on 700 maintenance work.

Brush painters continued interior paint program work and striped 40 crosswalks at schools.

Building Services

Doubling up of building service crews was necessary in some instances as a result of vacations and special work assignments.

Windows were washed in 761-762 Buildings during the month.

Use of leased pre-treated mops has proven satisfactory and more economical than the former system.

Steam Operation

Number 2 boiler was in service at the beginning of the month, with Numbers 1 and 3 in reserve, and Number 4 undergoing biennial major overhaul.

On August 9, it was necessary to place Number 1 boiler on the line and withdraw Number 2 unit from service due to failure of the water level alarm whistle mechanism.

At the close of the month, Number 1 was in service, Number 2 awaiting major overhaul, Number 3 in reserve, and Number 4 approaching completion of major overhaul.

The quantity of steam generated at 784 Plant was 3.2% less than for the same period of the previous year.

Replacement of the under-size four-inch safety valve discharge elbows and drip pan units with the proper size five-inch elbows was effected on all boilers during the month. This replacement was in accordance with the boiler inspector's recommendation and also with proper safety valve installation practice.

At Central Stores Heating Plant, cleaning of the 12,000 gallon fuel oil storage tank, and flushing of pump suction, discharge and relief lines was begun at the close of the month.

Coal consumed: 455.35 net tons.

Steam generated:	6,593.4 M. Lbs.
Steam leaving plant:	5,497.6 M. Lbs.
Steam delivered:	3,340.0 M. Lbs.

Total water softened:	1,157,200 gallons
Total soft water sent to Kadlec Hospital:	136,520 gallons
Total soft water sent to 784 Heating Plant:	1,020,680 gallons

TELEPHONE SUB-SECTION

The Stromberg-Carlson Company, contractor for furnishing and installing the telephone equipment in the 700 Area Plant exchange, returned a crew of installers to Richland on August 22 to correct improper cabling and wiring installed prior to the cutover.

A new edition of the Richland directory was distributed August 20.

A new specification was prepared to be used as the basis for soliciting bids on future editions of the Richland telephone directory.

Telephone (Contin)

All Richland residential subscribers, formerly served from the North Richland exchange, were reconnected to the Richland exchange.

At the request of the Stores Sub-Section, telephone items presently stocked in Spare Parts were reviewed for the purpose of determining which items should be transferred to General Supplies and which should be declared Excess.

Plant Telephone Operations

At the request of the Superintendent, Stores Sub-Section, PBX switchboard service for all telephones in the Central Stores building were replaced with individual lines from the 700 Area exchange.

In the vicinity of the Central Stores Warehouse, North Richland branch cable No. 6 was spliced into Richland Cable No. 10 to complete a plan for extending Richland distribution cable facilities to serve Stores, Transportation and that part of the area east of Stevens Drive which was not transferred to the Army.

In connection with placing the 700 Area exchange in service, several distribution cables were half-tapped in the underground system. Work was continued on the removal of the cables to the Richland exchange and is approximately 90% complete.

During the month of August, equipment testing was continued in the new 700 Area exchange and approximately 30 items of improper equipment operation and incorrect wiring were observed and listed for correction by Stromberg-Carlson Company installation personnel. A 3-man crew from the Stromberg-Carlson Company is presently engaged in correcting the equipment deficiencies and incorrect wiring. It is estimated that the corrective work will be completed by September 20.

Installed a service-observing turret in the Chief Operator's office to replace temporary equipment installed prior to cutover of the new exchange.

Installed resistance lamps to replace fuses in the generator supply leads to connectors in the 700 area exchange.

In connection with a plan to excess the unused telephone plant at White Bluffs Central Shops area, approximately 200 manhours were expended performing the following work:

- 1 - In order to eliminate a continuing need for an existing cross-connecting frame in the Central Shops area and to permit its removal, aerial cables were respliced to provide direct connections from the White Bluffs main distributing frame to cable terminals in the Central Shops area.
- 2 - Cut off about 7000 lineal feet of aerial cable and arranged with the Electrical Utilities Section for its removal.
- 3 - Removed about 150 unused service drops.
- 4 - At White Bluffs, cable circuits and terminal wiring were furnished to provide an alarm circuit interconnecting the Fire Station, Warehouse No. 1 and the Minor Construction Electrical Shop.

Installed a cable terminal near the Fire Station in the 100-B area to eliminate several long service wire installations.

Plant Telephone Operations (Contin)

Relocated the "night-service" jacks in the 700 area exchange switchboard and added a second set of jacks.

Conferred with General Electric Plant Accounting and Atomic Energy Commission Property personnel regarding removal of unused and unneeded telephone distribution cables in the White Bluffs Central Shops area and prepared Job Specification P-56-4 to cover removal work to be performed by General Electric forces.

Commercial Telephone Operations

Transferred telephone service in the W-20 office building to Cable 10 in order to make pairs available in Cable 7 for serving new residential subscribers in the dormitories between Lee and Knight Streets.

Installed 1A key equipment for the Columbia Service Company in their new location.

Coincidentally with distribution of the new Richland directory, approximately 100 residential and business subscriber number changes were made to achieve improved distribution of operating load upon the exchange equipment.

Modified the 4400-group connectors in the Richland exchange to make them function as PBX type connectors.

Prepared eight minor engineering jobs relating to outside plant expansion and improvement in Richland.

Completed modification of all local and trunk first selectors in the Richland exchange to make them hunt trunks in the order 1 to 10.

Modified all PBX connectors so that any odd digit may be used for non-trunk hunting and any even digit may be used for trunk hunting operation.

In the North Richland exchange, the 400, 500 and 600-line groups were deactivated since the exchange now serves only the Camp Hanford PBX and Camp Hanford pay stations. Also, the number of trunks from the North Richland exchange to the Richland exchange was reduced from 24 to 15.

Completed assembling a special PBX switchboard for the Central Fire Station which will be installed during the month of September.

The Kadlec Hospital PBX switchboard was disabled for approximately 1-1/2 hours on August 29 because of the development of a circuit difficulty in the switchboard that caused the main battery fuse to be blown.

During the month, 139 new residential telephones were installed and 53 residential telephones were reinstalled on an outside move basis. One-hundred and eight new requests for residential telephones were received during the month.

Currently, new residential telephones being installed are for customer requests received in June; and installations for outside moves are for requests received in July.

Radio System Operations

Installed sound equipment in the General Electric float constructed for the Atomic Frontier Days parade.

Serviced the public address system used by the Community Activities Unit at the softball field in Memorial Park.

Recorded Science Forum programs on August 3, 10, 17 and 24.

Shop-serviced 37 mobile receivers, 38 mobile transmitters, one fixed station transmitter, one fixed-station receiver and 11 pack sets.

Field-serviced 68 mobile transmitter-receiver sets, eight fixed-station transmitter-receivers, four intercommunication systems, four sound projectors, two tape recorders, two radio remote control units and one broadcast receiver.

Installed eight and removed six mobile type transmitter-receiver sets.

• Routine-checked two fixed-station transmitter-receiver sets.

Installed a mobile transmitter-receiver set in a Richland fire tank truck.

Radio Station KKE 624, No. 9, was out of service on August 17 from 12 Midnight to 9:30 AM due to tube failure. The outage was reported to the Radio Maintenance Unit at 8:00 AM.

Radio Station KKE 624, No. 13, was out of service on August 27 from 8:00 AM to 11:25 AM due to tube and microphone failure. Trouble report was received at 10:15 AM.

Radio Station KKE 624, No. 9, was out of service on August 30 from 4:49 AM to 9:50 AM due to tube and fuse failure. Notification of this trouble was received at 9:20 AM.

Statistical Data

	<u>At 20th of August</u>	<u>Change From Previous Month</u>	<u>Change From Year Ago</u>
Residential Subscribers	5759	+ 53	- 303
Business Subscribers	461	+ 2	- 22
Pavstation Telephones	46	- 19	- 21
Official Subscribers:			
Richland Exchange	244	No change	- 751
700 - 1100 Areas	870	+ 3	+ 870
Process Areas Exchanges	1634	+ 25	- 178
		<hr/>	<hr/>
		+ 64	- 405

New Service Requests Received During the Month:

For Residential Service	108
For Business Service	10

TOTAL	118
-------	-----

Statistical Data (Contin)

Backlog of Service Requests:

For New Residential Telephones	194
For New Business Telephones	2
For Residential Outside Moves	61
For Business Outside Moves	0

TOTAL	257
-------	-----

Service Orders Processed:

In Connection with Business and Residential Service	665
In Connection with Plant Service	208

TOTAL	873
-------	-----

Telephone Facilities - Installed, In Service and Available:

	<u>Exchange Lines</u>			<u>Party Lines</u>
	<u>Installed</u>	<u>In Service</u>	<u>Available</u>	<u>Available</u>
Richland Community	4006	3455	551	697
700 - 1100 Areas	1230	811	419	
Process Areas	1950	1627	323	
	<u>7186</u>	<u>5893</u>	<u>1293</u>	<u>697</u>

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	- 1
Mobile Stations	154	/ 1	/ 5
	<u>188</u>	<u>/ 1</u>	<u>/ 4</u>

SECURITY AND PATROL

Document Report

Number of classified documents and prints unaccounted for as of August 1: 316
(109 of the above 316 documents are chargeable to du Pont Company)

Number of classified documents and prints reported as unaccounted for during August: 0

Number of classified documents and prints either recovered or downgraded in classification during August: 4
(Three of the documents were located and one was downgraded in security classification)

Document Report (Contin)

Number of du Pont documents either recovered or downgraded in security classification during July (correction of July report):
(one document was located and 4 were downgraded in classification)

5

Number of classified documents and prints remaining unaccounted for as of September 1:
(104 of the above 307 documents are chargeable to du Pont Company)

307

Security Education

Seven security items appeared in the GE NEWS during the month.

There were 362 security meetings held and attended by 5,397 HAPO personnel. A representative of the Plant Protection Services Unit showed one of the security films at some of these meetings as indicated below:

<u>Film Title</u>	<u>Number of Meetings</u>	<u>Average Attendance per Meeting</u>	<u>Total</u>
Handle With Care	26	21	546
Badge of Honor	10	21	210
The Calculated Risk	1	14	14
Only the River	1	24	24

The security mobiles were changed in the areas during the month. The new set has five colored fish "swimming" and the appropriate security slogan is "Get In the Swim with Security".

A security item appeared in the August 15, 1955, Management News Bulletin. It concerned the proper storage and handling of carbon paper used to make copies of a classified document in order to avoid security violations.

GE Security Bulletin No. 95 entitled "The Lid's Still On" was issued August 9.

Eighty-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 23 employees received the "L" security orientation lecture during the reporting 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	99	96	96	96	99	0	0	1
Escorts	31	40	13	69	57	5	27	16
Ambulance Runs	2	3	2	2	3	1	4	5
Passes issued:								
One day temporary	36	18	7	25	23	8	53	65
Travel	0	0	0	0	0	0	0	174
Red Tag	134	48	22	56	27	111	531	154
Telephonic	0	0	0	0	0	0	0	11
Supervisor's Post Contacts	425	166	194	162	405	357	488	203

Other Patrol Activities (Computed by Hours)

	<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 & 700</u>
File Check	185	229	226	377	371	304	304	2,442
Building Check	348	128.5	242	1,047	371	304	304	792

Arrest Report

<u>Violations</u>	<u>Number of Violations</u>	<u>Cont. Cases from July</u>	<u>Cases Cleared</u>	<u>Pending</u>	<u>Fined</u>
Illegal Parking	2	2	2	2	2
No Driver's License	3	1	3	1	3
Speeding	1	1	1	1	1
	—	—	—	—	—
TOTALS	6	4	6	4	6

Citation Tickets issued: 6
Warning Tickets issued: 30
Verbal Warnings 0

Patrol Training Activities

582 Patrolmen attended classroom instruction during the month. (There are only 433 men on the roll, some of them attended more than one session.

246 Patrolmen attended Firearms Training during the same period.

General

Effective August 1, 1955, a new visitor register procedure was established for the 700 Area, revising the old procedure. The new form to be used eliminated the Visitor Register, the Visitor Escort Card form, and the Escort Record retained by Security.

On August 2, 1955, the Security Unit assisted in escorting representatives of the Atomic Power Development Association on a plant bus tour of the areas.

During the first part of this reporting period, all 105 Building Control Room doors were posted with signs stating that "Q" security clearance was required for entrance to these rooms.

On August 15, the Security Unit advised all Section Managers of the reinvestigation program, requested by the Atomic Energy Commission, of all employees hired during the period from January 1, 1950 through June 30, 1951. Personnel Security Questionnaire forms were distributed to the 1,375 General Electric employees concerned, with instructions for completing them as soon as possible. As of the end of August, approximately 1,000 questionnaire forms had been forwarded to the Commission.

During August, a survey was conducted with various departments in an effort to reduce the number of active Top Secret clearances. As a result of the review, clearances for 95 employees were cancelled.

A plant bus tour of the areas was made by representatives of the Puget Sound Utilities Council on August 26, and the Security Unit assisted in escorting the group.

Security and Patrol - General (Contin)

On August 29, a new material pass "Classified and/or Radioactive Material Pass" was placed into use for the movement or removal of classified and/or radioactive materials out of the plant areas and through the perimeter barricades.

A total of 1,403 audits and inspections of General Electric employees who are custodians of classified documents and prints have been made since September 1, 1954, through August 31, 1955. All custodians of classified material have now been audited and inspected, thus completing the first year of this survey.

Security Administration

Daily Badge Log Entries	2,800	
"Q" Clearances	85	
"L" clearances	23	
Formal "P" clearances issued	23	
"P" approval clearances issued	36	
Category access granted	44	
Category access withdrawn	51	
Category access revised	36	
Number of photos for "A" badges	663	
Number of photos for "B" badges	3,079	
Number of persons rephotographed	14	
Total number of photo identification passes laminated and issued		396
Total number of "A" badges assembled and distributed to the areas		631
Total number of "A" badges received from the areas		613
Total number of "A" badges received from areas for repair		51

Top Secret Clearances

Top Secret clearances cancelled during August	133
Clearances granted	36
Number of Top Secret clearances requested	30

DECLASSIFIED

HANFORD ATOMIC PRODUCTS OPERATION
General Electric Company
Richland, Washington

REPORT OF VISITORS FOR PERIOD ENDING AUGUST 31, 1955

<u>Name - Organization</u>	<u>Purpose of Visit</u>	<u>Person Contacted</u>	<u>Arrival</u>	<u>Departure</u>	<u>Restricted Data</u>	
					<u>Class.</u>	<u>Unclass.</u>
<u>ENGINEERING DEPARTMENT - ADVANCE ENGINEERING SECTION</u>						
<u>I. Visits to other Installations</u>						
F. W. Albaugh to: Argonne National Lab. Lemont, Illinois	Classification discussions in conjunction with General Conference	C. D. Luke	8-31-55	9-2-55	X	
P. F. Gast to: Geneva, Switzerland	Attend United Nations International Conference on Peaceful Uses of Atomic Energy-Reactor Physics	-	8-5-55	8-20-55		X
W. K. Woods to: Geneva, Switzerland	Attend United Nations International Conference on Peaceful Uses of Atomic Energy-Radiation Damage Effects	-	8-5-55	8-20-55		X
J. B. Work to: U. S. Atomic Energy Comm. Washington, D. C.	Combined operations discussions with Operations Analyses group	C. D. W. Thornton	8-24-55	8-26-55	X	

ENGINEERING DEPARTMENT - DESIGN SECTION

<u>I. Visits to other Installations</u>						
A. B. Carson to: General Electric Company Schenectady, New York	Consultation on reactor design development program	B. R. Prentice J. R. Wolcott	8-4-55	8-5-55	X	
H. D. Tibbals to: Knolls Atomic Power Lab. Schenectady, New York	Discuss plant construction complexity as related to engineering costs	J. C. Nowell E. G. Butts	8-29-55	8-31-55		X

DECLASSIFIED

Restricted Data
Class. Unclass. Areas

Name - Organization

Purpose of Visit

Person Contacted

Arrival

Departure

ENGINEERING DEPARTMENT - ENGINEERING ADMINISTRATION SECTION

I. Visits to other Installations

R. R. Barber
to: Phillips Petroleum Co.
Idaho Falls, Idaho

8-1-55

8-1-55

X

ENGINEERING DEPARTMENT - PROJECT SECTION

I. Visits to other Installations

E. W. Powell
to: Oak Ridge National Lab.
Oak Ridge, Tennessee

8-9-55

8-17-55

X

E. W. Powell
to: Carbide and Carbon
Paducah, Kentucky

8-9-55

8-17-55

X

E. W. Powell
to: E. I. du Pont de Nemours & Co.
Savannah River Plant
Augusta, Georgia

8-9-55

8-17-55

X

ENGINEERING DEPARTMENT - FILE TECHNOLOGY AND SEPARATIONS TECHNOLOGY SECTIONS

I. Visitors to this Works

R. O. Bolt
California Research Corp.
San Francisco, California

Discuss Gamma facilities re AT/11/1/-174

J. A. Berberet

8-8-55

8-9-55

X

100-B 105-C
100-D 105
100-F 105
100-H 105
100-K 105-KE, KW
300 XXX

T. F. Fisher
Knolls Atomic Power Lab.
Schenectady, New York

Hot laboratory operations L. D. Turner
metallography of fuel J. A. Berberet
elements, and exchange of
information

8-15-55

8-19-55

X

100-K 105-KW
300 XXX

UNCLASSIFIED

DECLASSIFIED

Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data	
					Class.	Unclass. Areas
J. B. Frankel Northwestern University Evanston, Illinois	Consultation on contractual agreement	V. R. Cooper W. P. Wallace	8-15-55	8-19-55	X	306-L 303 700
E. J. Frederick Oak Ridge National Lab. Oak Ridge, Tennessee	Discuss and study engineering design and operations of high level radiometallurgy facilities and analytical control	A. E. Smith L. D. Turner	8-4-55	8-5-55	X	200-E 202-ACR 200-W Redox 300 XXX
A. T. Gresky Oak Ridge National Lab. Oak Ridge, Tennessee	Discuss Thorex chemical processing	F. W. Woodfield	8-8-55	8-9-55	X	200-E 201-C 200-W Redox, 221-L 300 XXX; 700
T. R. Nevill, Jr. Knolls Atomic Power Lab. Schenectady, New York	Discussion and observation of the KAPL-120 in-pile loop project	G. E. Wade	8-6-55	8-20-55	X	100-H 105 100-K XXX 300 XXX; 700
J. W. Robinson National Lead Company Fernald, Ohio	Discuss analytical application of X-ray and emission spectroscopy, uranium, orange oxide, and polarographic control	W. H. Reas	8-8-55	8-9-55	X	202-ACR 200-W Redox 300 XXX
M. J. Ryan Radiation Laboratory University of California Berkeley, California	Discuss fabrication of parts	J. J. Cadwell	8-15-55	8-19-55	X	200-W 234, 235 300 XXX
R. H. Simon Knolls Atomic Power Lab. Schenectady, New York	Inspection of KAPL-210 facilities and Hanford high pressure water facilities and program	L. P. Bupp	8-17-55	8-19-55	X	100-H 105 100-K 105-KE
G. L. Stukenbroeker National Lead Company Fernald, Ohio	Discuss analytical application of X-ray and emission spectroscopy, uranium, orange oxide, and polarographic control	W. H. Reas	8-8-55	8-9-55	X	202-ACR 200-W Redox 300 XXX

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Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data	
					Class.	Unclass. Areas
G. W. Watt University of Texas Austin, Texas	Consultation on separations technology problems	R. B. Richards	8-1-55	8-5-55	X	200-W Redox, 234, 235 300 XXX; 700-
D. M. Wilsey All States Employee Schenectady, New York	Instrumentation work on KAPL-in-pile water loop modification	G. E. Wade	5-1-55	10-1-55	X	100-B 105-B, 105-C 100-D XXX 100-H 105 100-F XXX 100-K 105-KW 300 XXX
R. P. Wischow Oak Ridge National Laboratory Oak Ridge, Tennessee	Discuss Thorex chemical processing	F. W. Woodfield	8-8-55	8-9-55	X	200-E 201-C 200-W Redox, 221-U 300 XXX; 700
II. Visits to other Installations						
J. A. Berberet to: Knolls Atomic Power Lab. Schenectady, New York	Discuss problems on KAPL-120 in-pile loop	R. H. Simon	8-25-55	8-26-55	X	
J. H. Brown to: Oak Ridge National Lab. Oak Ridge, Tennessee	Consultation regarding assistance to Hanford	J. A. Cox	8-1-55	8-2-55	X	
J. H. Brown to: Brookhaven National Lab. Upton, Long Island, New York	Consultation regarding assistance to Hanford	R. W. Powell	8-3-55	8-4-55	X	
R. O. Brugge to: Oak Ridge National Lab. Oak Ridge, Tennessee	Consultation regarding assistance to Hanford	J. A. Cox	8-1-55	8-2-55	X	
R. O. Brugge to: E. I. du Pont de Nemours & Co. Wilmington, Delaware	Present paper at meeting	G. W. Edwards	8-3-55	8-3-55	X	
R. O. Brugge to: Brookhaven National Lab. Upton, Long Island, New York	Consultation regarding assistance to Hanford	R. W. Powell	8-4-55	8-5-55	X	

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Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data	
					Class.	Unclass.
						Areas
S. H. Bush to: Knolls Atomic Power Lab. Schenectady, New York	Consultation on HAPO assistance program	W. Cashin	8-22-55	8-24-55	X	
S. H. Bush to: Battelle Memorial Inst. Columbus, Ohio	Revision of Reactor Handbook	J. Keeler	8-25-55	8-25-55	X	
J. J. Cadwell to: Knolls Atomic Power Lab. Schenectady, New York	Discuss fuel element technology	C. E. Weber	8-22-55	8-26-55	X	
A. C. Callen, Jr. to: U. S. Atomic Energy Comm. Wilmington, Delaware	Present paper at Thorium- U-233 technical informa-	G. W. Edwards	8-3-55	8-3-55	X	
A. C. Callen, Jr. to: National Lead Company Fernald, Ohio	Observe uranium fabrica- tion	C. E. Polson	8-4-55	8-5-55	X	
D. O. Darby to: E. I. du Pont de Nemours Savannah River Plant Augusta, Georgia	Discuss ion exchange & Co. and other separations problems	L. C. Peery D. A. Orth F. Tober	8-22-55	8-24-55	X	
D. O. Darby to: Oak Ridge National Lab. Oak Ridge, Tennessee	Discuss ion exchange and other separations problems	F. L. Culler I. Higgins	8-25-55	8-26-55	X	
T. W. Evans to: Phillips Petroleum Co. Idaho Falls, Idaho	Inspect test specimen in the Material Test	D. R. Alvord	8-22-55	8-25-55	X	
T. W. Evans to: Phillips Petroleum Co. Idaho Falls, Idaho	Observe ruptured slug in Material Test Reactor	D. R. Alvord	8-31-55	9-3-55	X	
J. M. Fouts to: Phillips Petroleum Co. Idaho Falls, Idaho	Inspect measuring device in their canal	D. L. Alvord	8-22-55	8-23-55	X	

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Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data	
					Class.	Unclass.
E. R. Irish to: E. I. du Pont de Nemours & Co. and other Savannah River Plant Augusta, Georgia	Discuss ion exchange and other separations problems	L. C. Peery D. A. Orth F. Tober	8-22-55	8-24-55		X
E. R. Irish to: Oak Ridge National Lab. Oak Ridge, Tennessee	Discuss ion exchange and other separations problems	F. L. Culler I. Higgins	8-25-55	8-26-55		X
P. M. Jackson to: Knolls Atomic Power Lab. Schenectady, New York	Discuss problems relative to KAPL-120 loop	R. H. Simon	8-25-55	8-26-55		X
C. R. McNutt to: National Reactor Testing Station HAPPO high flux Phillips Petroleum Co. Idaho Falls, Idaho	Inspect facilities for irradiation tests	C. Leyse	8-29-55	8-29-55		X
J. E. Minor to: Phillips Petroleum Co. Idaho Falls, Idaho	Inspect test specimen in the Material Test Reactor	D. R. Alvord	8-22-55	8-25-55		X
W. J. Ozeroff to: Knolls Atomic Power Lab. Schenectady, New York	Discuss KAPL assistance to Hanford	T. M. Snyder	8-3-55	8-4-55		X
E. C. Pitzer to: Knolls Atomic Power Lab. Schenectady, New York	Discuss details of fuel elements at KAPL	L. Pepkowitz	8-22-55	8-24-55		X
D. C. Pound to: Oak Ridge National Lab. Oak Ridge, Tennessee	Consultation regarding assistance to Hanford	J. A. Cox	8-1-55	8-2-55		X
D. C. Pound to: Brookhaven National Lab. Upton, Long Island, New York	Consultation regarding assistance to Hanford	R. W. Powell	8-3-55	8-5-55		X
O. W. Rathbun to: Mallinckrodt Chem. Works St. Louis, Missouri	Observe uranium processing relative to slug cores at Hanford	W. M. Leaders	8-1-55	8-2-55		X

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Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data	
					Class.	Unclass. Areas
O. W. Rathbun to: National Lead Company Fernald, Ohio	Observe uranium fabrication	C. E. Polson	8-1-55	8-5-55	X	
R. L. Reynolds to: Phillips Petroleum Co. Idaho Falls, Idaho	Inspect measuring device in their canal	D. L. Alvord	8-22-55	8-23-55	X	
J. W. Riches to: Bridgeport Brass Co. Adrian, Michigan	Consultation on uranium metallurgy	R. M. Treco	8-8-55	8-12-55	X	
J. W. Riches to: Bridgeport Brass Co. Adrian, Michigan	Experimental fabrication of uranium	R. M. Treco	8-21-55	8-26-55	X	
M. J. Sanderson to: Phillips Petroleum Co. Idaho Falls, Idaho	Observe ruptured slug in Material Test Reactor	D. R. Alvord	8-31-55	9-3-55	X	
R. E. Tomlinson to: Geneva, Switzerland	Attend United Nations International Conference on Peaceful Uses of Atomic Energy	-	8-5-55	8-20-55		X
R. E. Tomlinson to: British Atomic Energy Harwell, England	Inspect facility	-	8-26-55	8-26-55	X	
W. P. Wallace to: Bridgeport Brass Co. Bridgeport, Connecticut	Zirconium discussion	R. S. French	8-26-55	8-26-55	X	
W. P. Wallace to: Bridgeport Brass Co. Bridgeport, Connecticut	Zirconium tube requirements and facilities	R. M. Treco	8-11-55	8-12-55	X	

I. Visitors to this Works (cont'd)

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Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data	
					Class.	Unclass.
R. M. Howard U. S. Air Force Washington, D. C.	Process consultation	F. W. Woodfield	8-9-55	8-9-55	X	300 XXX
J. N. Robinson, Jr. U. S. Air Force Washington, D. C.	Process Consultation	F. W. Woodfield	8-9-55	8-9-55	X	300 XXX
W. H. Stephens U. S. Air Force Washington, D. C.	Process consultation	F. W. Woodfield	8-9-55	8-9-55	X	300 XXX
W. T. Woodyard U. S. Air Force Washington, D. C.	Process consultation	F. W. Woodfield	8-9-55	8-9-55	X	300 XXX
J. L. Yucker, Jr. U. S. Air Force Washington, D. C.	Process consultation	F. W. Woodfield	8-9-55	8-9-55	X	300 XXX
MANAGEMENT						
I. Visits to other Installations						
W. E. Johnson to: U. S. Atomic Energy Comm. Washington, D. C.	Contract negotiations	D. F. Shaw E. J. Bloch	8-9-55	8-9-55	X	
OPERATIONS RESEARCH STUDY						
I. Visits to other Installations						
P. M. Thompson to: Rand Corporation Santa Monica, California	Discuss linear programming machine coding problems	W. Orchard-Hays G. Dantzig A. W. Marshall	8-12-55	8-22-55	X	
MANUFACTURING DEPARTMENT						
I. Visitors to this Works						

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Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data	
					Class.	Unclass. Areas
B. B. Boecker University of Washington Seattle, Washington	Work on Fellowship Program	P. C. Jerman J. G. Myers M. M. Cox R. B. Hall L. V. Barker	8-1-55	8-12-55	X	100-B 105-B, 105-C 100-D 105 100-F 105 100-H 105 100-K 105-KW, KE
R. G. Page University of Washington Seattle, Washington	Work on Fellowship Program	P. C. Jerman J. G. Myers M. M. Cox R. B. Hall L. V. Barker	8-1-55	8-12-55	X	100-B 105-B, 105-C 100-D 105 100-F 105 100-H 105 100-K 105-KW, KE
J. B. Romero University of Washington Seattle, Washington	Work on Fellowship Program	P. C. Jerman J. G. Myers M. M. Cox R. B. Hall L. V. Barker	8-1-55	8-12-55	X	100-B 105-B, 105-C 100-D 105 100-F 105 100-H 105 100-K 105-KW, KE
S. J. Rafferty University of Washington Seattle, Washington	Work on Fellowship Program	P. C. Jerman J. G. Myers M. M. Cox R. B. Hall L. V. Barker	8-1-55	8-12-55	X	100-B 105-B, 105-C 100-D 105 100-F 105 100-H 105 100-K 105-KW, KE
T. L. Smith University of Washington Seattle, Washington	Work on Fellowship Program	P. C. Jerman J. G. Myers M. M. Cox R. B. Hall L. V. Barker	8-1-55	8-12-55	X	100-B 105-B, 105-C 100-D 105 100-F 105 100-H 105 100-K 105-KW, KE

II. Visits to other Installations

A. Brunstad to: Dow Chemical Company Rocky Flats Laboratory Denver, Colorado	Confer on plutonium metal analyses	J. Epp	8-15-55	8-15-55	X
R. L. DeCenzo to: Aircraft Nuclear Propulsion Evandale, Ohio	Discuss testing methods	E. W. Rebol	8-17-55	8-17-55	X

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- 10 -

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Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data Class. Unclass.	Areas
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RADIOLOGICAL SCIENCES DEPARTMENT

I. Visits to other Installations

R. F. Foster to: Geneva, Switzerland	Attend United Nations International Conference on Peaceful Uses of Atomic Energy	-	8-5-55	8-20-55	X	
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H. M. Parker to: Geneva, Switzerland	Attend United Nations International Conference on Peaceful Uses of Atomic Energy	-	8-5-55	8-20-55	X	
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H. M. Parker to: British Atomic Energy Harwell, England	Inspect facilities	-	8-25-55	8-27-55	X	
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HW-38828

RADIOLOGICAL SCIENCES DEPARTMENT

AUGUST 1955

SUMMARY

Twenty-four informal, fourteen Class I, and one Class II radiation incidents were recorded. The single technical overexposure referred to a hand exposure between 1.5 and 3 rads.

Emission of I^{131} from process stacks was maintained at a satisfactory level.

An inventory of wastes sent to ground shows that 50% of the total activity was released in the last fiscal year. This was largely achieved through radiological sciences advancements in logical testing and control of wastes.

Temperature changes in the Columbia River have been found to be more responsive to solar heat on the McNary impoundment than to Hanford effluents.

One department representative presented our work at a tripartite conference at Harwell, and two read five department papers at the Geneva Conference on peaceful uses of atomic energy.

RADIOLOGICAL SCIENCES DEPARTMENT

AUGUST 1955

The month-end force of 422 included 36 supervisors, 95 engineers and scientists, 24 clerical and 267 other personnel.

Number of Employees on Payroll

Beginning of Month	420
End of Month	<u>422</u>
Net Increase	2

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.

Name

Title of Invention

None

None

There were 39 radiation incidents, including 14 Class I incidents and one Class II incident. The latter referred to hand exposure between 1.5 and 3 rads to a radiological scientist engaged in sampling a test well found later to have a defective casing. One of the Class I incidents concerned exposure of about 30 minor construction employees to undue air contamination during clean-up work at the B Plant Canyon. It was found at Geneva that many other groups are working on the problem of prompt detection of plutonium contaminants in the air in the presence of the radon and thoron decay products that swamp the required reading. A Canadian method, depending on a particle size separation, has been tested also in England with promising, but not yet conclusive, results. It will be tested under Hanford conditions. Solution of this troublesome technical problem would be of great value to the operation in controlling exposure to airborne contaminants.

Three additional cases of failure to wear personnel meters correctly were recorded in the month in which the poster contest designed to promote effective wearing was carried out. Although this is a discouraging start, it is still hoped that publicity and voluntary cooperation will achieve more in this respect than would a system of penalties.

In matters relating to disposal to the river, further laboratory progress was made in effluent analysis, and present and future drinking water hazards received a more elaborate course of calculation. Important calculations on heating effect, chromium toxicity, and radiotoxicity as the river may be affected by manipulations of the Priest Rapids Dam were also made. At the Geneva Conference, the British practice of waste disposal at sea was the target of several comments relating to the international problem of ocean contamination. Fortunately, it did not occur

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Radiological Sciences Department

to anyone (or at least was not publicly voiced) that the Hanford practice of discharge of effluents to the Columbia River is also a form of disposal into the ocean, without the benefit of the 2 mile pipeline used in the British work. It might have been surprising to most delegates to learn that the total activity entering the sea, with due allowance for decay and other losses en route, from our operation exceeds that released by the British. Since the matter will eventually be raised at the international level, it would be expedient to explore the coastal contamination at this time. One striking result of the British investigations is that radioelements with relatively high uptake into aquatic organisms may have low uptake in marine organisms, and vice versa. Apparently, radiostrontium is in the first category and plutonium in the vice versa group.

Waste disposal to the ground was generally successful. Even the 13th tankful of TBP wastes successfully passed its tests for release, despite the witchcraft and superstition still associated with the waste disposal art that we expect eventually to develop into a controlled technology.

An inventory of all waste releases to ground since the start of operations indicated that 50% of the total activity was released in the last fiscal year. Although this reflects in part the recent increases in production rate, it was achieved mainly through the developments in radiological sciences studies of disposal. In view of the major savings to be effected by additional releases under adequately studied conditions, it is unfortunate that efforts to accelerate such studies have not yet had the necessary budget support.

From time to time there has been difficulty with the plugging of cribs or swamps, and this occurred recently at the U Swamp. Here it was found to be due to a change in laundry process that produced wastes tending to deflocculate clays. It is believed that addition of gypsum will prevent this, and that the method can be applied to other disposal facilities to increase their percolation rate and total life.

In the field of atmospheric contamination, emission of I^{131} averaged 7 curies per week, with only one day in which the release exceeded the provisional maximum of 3 curies. This is the best experience in recent months. No area of vegetation outside the reservation was excessively contaminated.

At the request of the AEC, radioanalysis of decayed leaves and other debris from gutters in Hood River, Oregon was performed. The composition, together with evidence of bomb debris fallout in that area in 1954, established that the contamination was of that origin; suggestions that the material came from Hanford practices can be categorically denied.

Only four of over 2,000 personal surveys for particle contamination showed positive results, none representing significant exposure. Only 3.6% of vehicles surveyed had particle contamination.

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HW-38828

Radiological Sciences Department

Some of the biological work of the department was presented at a tripartite conference at Harwell. Two members of the department served as technical advisors at the Geneva Conference on peaceful uses of atomic energy; five papers on the department's activities were read at this meeting. At both meetings, the broad scope and competence of local studies relating to radioactive effluent release appeared to be recognized.

In visits to atomic energy installations in England, it was of interest to compare the technology of gas-cooled reactors with that of water-cooled reactors, and to observe differences in radiation protection practices. British protection is highly competent in many respects (although overall exposure records are not as favorable as at Hanford), and some interesting approaches can be integrated profitably into the local system.

At Geneva, the Russian approach to radiation protection aroused considerable interest. The standards used there proved to be far more conservative than our own. However, no actual exposure experience was given, other than an account of major accidental exposures to two individuals. Russian preoccupation with possible neurological damage by radiation was in striking contrast to the experiences of other nations.

HM Parker

Director,
RADIOLOGICAL SCIENCES DEPARTMENT

HM Parker:kss

Radiological Sciences Department

APPENDIX

1. Condensed Exposure Records

Type	Number of Readings	Potential High Results	Confirmed High Results
Pocket chambers - gamma	299,330	39	0
Pocket chambers - slow neutron	1,946	0	0
Film badges - beta-gamma	54,487	72	0
Film badges - neutron	802	0	0
Pu bioassay	1,005	31	0
F. P. bioassay	1,041	2	1
U bioassay	478	6	0
Alpha hand counts	65,729	6	0
Beta hand counts	72,107	0	0
Thyroid counts	176	0	0

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Radiological Sciences Department2. Regional Monitoring Records

Sample Type and Location	Activity Type	Average Activity Density /uc/ml	Trend* Factor
<u>Drinking Water and Related Materials</u>			
Benton City Water Company Well	alpha	1.4×10^{-8}	--
Richland, N. Richland, Benton City Wells	alpha	$(0.5 \text{ to } 1.4) \times 10^{-8}$	--
100 Areas	beta	$(0.8 \text{ to } 4.3) \times 10^{-7}$	--
200 Areas	beta	$(5 \text{ to } 8) \times 10^{-8}$	--
Pasco, Kennewick, McNary Dam	beta	$(0.5 \text{ to } 4.0) \times 10^{-7}$	-3
Backwash Solids-Pasco Filter Plant	beta	2.6×10^{-3} /uc/gm	-2
Backwash Liquids-Pasco Filter Plant	beta	5.0×10^{-7}	+3
Sand Filter - Pasco Filter Plant	beta	8.5×10^{-5} /uc/gm	+4
Anthracite Filter - Pasco Filter Plant	beta	1.1×10^{-4} /uc/gm	+3
<u>Other Waters and Related Materials</u>			
300 Area Wells #1, 2, 3	alpha	$(0.8 \text{ to } 10.0) \times 10^{-8}$	--
300 Area Well #4	alpha	5.8×10^{-8}	--
Well #4 measured as Uranium	U	7.8×10^{-8}	--
Other Wells on the Reservation	beta	$(0.05 \text{ to } 15) \times 10^{-6}$	-2
Columbia River - Hanford Ferry	beta	9.9×10^{-6}	--
Columbia River - Below Reactors	beta	5.2×10^{-6}	--
Columbia River - Paterson to McNary	beta	3.1×10^{-7}	--
Columbia River - shore mud	beta	$(0.2 \text{ to } 1.8) \times 10^{-4}$ /uc/gm	--
Raw Water - Operating Areas	beta	$(0.5 \text{ to } 10.0) \times 10^{-7}$	--
Reactor Effluent Retention Basins to River	beta	5,300 to 30,000 /uc/sec/reactor $(0.64 \text{ to } 9.3) \times 10^{-3}$	--
Reactor Effluent Retention Basins to River	alpha	<0.04 /uc/sec/reactor $<5 \times 10^{-9}$	--
I-131 in Farm Wastes to River	I-131	16 /uc/day 2.9×10^{-7}	-3
I-131 in Columbia River - Hanford	I-131	$<7 \times 10^{-8}$	-4
300 Area Pond Inlet	alpha	1.8×10^{-6}	+2

Radiological Sciences Department

Sample Type and Location	Activity Type	Average Activity Density /uc/ml	Trend* Factor
<u>Atmospheric Pollution</u>			
Gross Alpha Emitters	alpha	$(<4.0 \text{ to } 6.0) \times 10^{-15}$	--
Gross Dose Rate - Separations Areas	beta - gamma	$(0.51 \text{ to } 2.8) \text{ mrad/day}$	--
Gross Dose Rate - Residential Areas	beta - gamma	$(0.38 \text{ to } 0.74) \text{ mrad/day}$	--
Active Particles - Separations Areas	beta	$(3.2 \text{ to } 6.6) \times 10^{-13}$	-2
I-131 Separations Areas	I-131	$(0.4 \text{ to } 6.8) \times 10^{-13}$	--
I-131 Separations Stacks	I-131	1.0 curie/day	--
Ruthenium - Separations Stacks	Ru ¹⁰³⁻¹⁰⁶	$<0.01 \text{ curie/day}$	--
Active Particles - Wash., Idaho, Ore., Mont.	-	$< 0.0005 \text{ to } 0.006 \text{ ptle/m}^3$	-8
Active Particles - HAPO	-	$< 0.001 \text{ to } 0.31 \text{ ptle/m}^3$	--
Tritium (as oxides) - Reactor Stacks	T	0.09 curie/day	--
<u>Vegetation</u>			
Environs of Separations Areas	I-131	$(<3 \text{ to } 10) \times 10^{-6} \text{ /uc/gm}$	--
Residential Areas	I-131	$<3.0 \times 10^{-6} \text{ /uc/gm}$	--
Eastern Washington and Oregon	I-131	$<3.0 \times 10^{-6} \text{ /uc/gm}$	--
Non-Volatile Beta Emitters - Wash. and Oregon	beta	$(2.2 \text{ to } 3.2) \times 10^{-5} \text{ /uc/gm}$	--
Alpha Emitters - Separations Areas	alpha	$(<0.5 \text{ to } 5.0) \times 10^{-7} \text{ /uc/gm}$	--
Alpha Emitters - 300 Area	alpha	$6 \times 10^{-8} \text{ /uc/gm}$	--

* The trend factor shows the n-fold increase (+) or decrease (-) from last month, where values of n less than 2 will not be noted.

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FINANCIAL DEPARTMENT MONTHLY REPORT
AUGUST, 1955

The newly approved BTC program at Hanford got under way officially on September 12, when the first classes were held. Thirty-seven students were selected for the initial course, "Financial Analysis," the group being divided into four classes, with K. G. Grimm, J. P. Holmes, P. D. Lee and R. M. Watkins as instructors. The classes will be held one evening a week, from 7 to 9 o'clock, and the first semester will run 14 weeks. The responsibility for organization and administration of the program has been assigned to the Budgets and Measurements Section.

In view of recent Congressional action with respect to expenditures for construction projects, the General Electric Company now has a responsibility as a prime contractor to continually review the status and availability of funds for projects on which it performs management or architect-engineer-management services. Because of this, a detailed review of funds obligated as of June 30, 1955 for Plant and Equipment—Projects has just been completed, and a schedule reflecting all projects under way and authorized from funds appropriated by Congress for the fiscal year 1955 and prior years has been prepared. The opinion of HAPO's counsel as to the requirements of the law has been requested, and when the degree of the Company's responsibility has been more completely defined, consideration will be given to revising procedures for authorizing projects, obligating project funds, and controlling expenditures within obligated limits.

Upon request of the General Accounting Office representative, a detail of liquidations from Protection of Plant and Personnel and General Administrative Expense was prepared and submitted covering the fiscal year 1955.

A more equitable distribution of laundry cost between the 100, 200 and 300 Areas has been established. Since monitoring of laundry for Alpha contamination contributes about \$.05 per pound to the cost of the laundry operations, and practically no Alpha contamination is present on 100 and 300 Area laundry, two rates have been established: one to include the cost of Alpha monitoring (applicable to 200 Area only), and the second to exclude the cost of Alpha monitoring (applicable to 100 and 300 Areas).

Document HW 38372, "Analyses of Processing Cost Differential Redox vs. BiPO₄ - TBP," was issued by the Manufacturing Cost Unit to point out the difference in cost between operating the Redox Plant as compared to operating the BiPO₄ - TBP combination.

A physical inventory of 200 Areas' uninstalled equipment was started August 16. This inventory includes many items previously classified as uncataloged plant which currently have been reclassified as cataloged items to be individually accounted for. At month-end the inventory was 95% complete.

During the month, physical inventories were taken of special materials, excluding graphite, and of general supplies in custody of the Community Section. Reconciliations are in progress and final results should be reported during September.

Unitization reports for 100-K Area and Purex facilities were distributed during the month. In addition, a cost summary report was prepared for 100-K facilities for inclusion in the unitization report which summarized cost to date and estimated completion costs.

Two and one-half man months were expended in completing a report of federal real property at the request of AEC. The report will be required by the General Services Administration at each fiscal year-end.

Irradiation facilities in 100 B, D and F Areas were completely depreciated during the month of August. It has been apparent for some time that our depreciation rates on irradiation facilities were excessive and we have submitted two formal proposals to AEC requesting permission to make necessary revisions, but the Commission has taken no action.

In meetings with the representatives of the Manufacturing and Engineering Departments, attention has been directed to the need for firming up data sheets for FY 1957 budget items to meet the requirements of the revised practice of specific authorization by projects rather than the past practice of general appropriations by Congress. It has been pointed out that all possible effort should be directed to providing the necessary back-up information for projects which are critical to the HAPO production goal forecasts for fiscal year 1957. Also, it has been recommended that General Plant Projects which cannot be accomplished during FY 1956 be firmed up and submitted as line items for addition to the FY 1957 budget prior to October 15, 1955.

During the month three project planning meetings were held with representatives of the Engineering Department and three with Manufacturing Department representatives. Projects reviewed for scope, justification, and cost included: Building 221-U, Section 9—Conversion to Intercycle Concentration; TBP Plant Product Tail-End Treatment; Redox Capacity Increase, Phase III; Zone Temperature Monitoring - 100 B, C, D, DR, F and H; and Design of Continuous Charge-Discharge Equipment.

Seven project proposals and two informal requests representing an aggregate of \$2,950,000 were reviewed, approved, and processed to the Commission during the month. After receipt and analysis of AEC directives and work authorities, fourteen project authorizations were issued for a total of \$12,766,500.

Conversion of the weekly payroll from the punched-card, machine-produced system to utilize the 702 electronic data processing machine was completed with the issuance of checks for the week ending August 21 on the 702 equipment. Conversion had been delayed because of air conditioning trouble, and later, machine difficulties caused by a poor ground connection in the console. Other applications will be converted to the 702 as soon as possible and should be accomplished with greater ease because of the experience gained in the payroll conversion program.

Preliminary work on the construction of an addition to the Records Center which will provide 6000 square feet of storage space (an increase of 50% of the present floor area) was begun in August by the contractor, the Lewis Hopkins Company.

For the past several months, one of the most complex SS accountability problems has been presented by the cored slug program, which has been subject to innumerable process changes. During August, a mid-month change in process involved the use of aluminum in lieu of normal uranium inserts for both drilled and extruded slugs. This change resulted in unusual month-end inventory conditions and practically every balance area in the process was confronted with multiple slug types and weights.

Considerable time and effort has been devoted to the problem of custodian control with specific reference to the functions of the Fuel Technology Sub-Section and the Radiometallurgy Unit. Since discrepancies were found to have been due to the method of records procedure, both components are now changing over to a location chart control, proposed by the SS Accountability Section, in which geographic location, quantity, basis of inventory, and use are related.

A plant-wide SS material survey for all Engineering groups has been scheduled to start in October. The survey will be directed towards determining whether SS material control procedures are being followed.

Detailed reports for the Financial Department appear on succeeding pages, as follows:

Summary of Cash Disbursements, Receipts and Advances	I - 4
Auditing Section	I - 5
Budgets and Measurements Section	I - 6
Contract Cost Section	I - 7 through I - 8
General Accounting Section	I - 9 through I - 13
Personnel Accounting Section	I - 14 through I - 16
Procedures and Computing Section	I - 17 through I - 19
Property Accounting Section	I - 20 through I - 27
SS Accountability Section	I - 28 through I - 32
Personnel and Organization Statistics	I - 33 through I - 34

SUMMARY OF CASH DISBURSEMENTS,
RECEIPTS AND ADVANCES

A summary of cash disbursements and receipts (excluding advances of \$6,000,000 and \$7,950,000, respectively, by the Atomic Energy Commission) for the months of August and July, 1955, is shown below:

<u>Disbursements</u>	<u>August</u>	<u>July</u>
Payrolls (net)	\$3 057 348	\$3 637 246
Materials and Freight	1 708 211	1 607 686
Payroll Taxes	820 920	1 011 758
Payments to Subcontractors	480 452	538 259
United States Savings Bonds	217 874	246 979
Group Insurance Premium	147 055	146 768
Pension Plan - Employees' Portion	114 468	99 943
Travel Advances to Employees	72 447	68 254
All Other	119 905	221 245
 Total	 6 738 680	 7 578 139
 <u>Receipts</u>		
Rent	119 004	101 325
Electricity	60 348	62 474
Washington State Pension Award Adjustment	53 336	-0-
Telephone	52 894	52 055
Hospital	41 812	43 352
Sales to AEC Cost-type Contractors	20 095	14 685
Sundry Accounts Receivable	23 978	9 636
Bus Fares	9 503	7 870
Refund of Travel Advances to Employees	7 786	6 039
Refunds from Vendors	130	1 358
Other	6 043	5 158
 Total	 394 929	 303 952
 Net Disbursements	 \$6 343 751	 \$7 274 187

Outstanding advances as of August 31, and July 31, 1955 were as follows:

	<u>August</u>	<u>July</u>
Cash in Bank - Contract Accounts	\$2 059 799	\$2 403 559
Cash in Bank - Salary Accounts	20 000	20 000
 Total	 \$2 079 799	 \$2 423 550

AUDITING SECTION
MONTHLY REPORT - AUGUST, 1955

Reports were issued for the following completed audits listed below:

- Bank Account Reconciliations and Cash Controls
- Work Orders
- Richland Community Council Fund

Field work was continued on the following audits:

- Plant Libraries
- Taxes
- Shipping Activities

The following audits were started during the month:

- Administrative Services - Office Auxiliaries Sub-Section
- Material and Package Passes
- S. S. Accountability

Follow-ups were made to determine the extent of compliance with recommendations made in reports of the following audits:

- Medical Aid, Industrial Insurance and Pension Awards
- Plant Mail Services
- General Electric Employees Savings and Stock Bonus Plan
- Accounts Payable

Four employee information meetings, one of which covered security, were held during the month.

BUDGETS AND MEASUREMENTS SECTION
MONTHLY REPORT - AUGUST, 1955

General

Responsibility for organization and administration of the newly approved BTC Program at Hanford was assigned to this Section and is being personally handled by the Manager. Thirty-seven students were selected for the initial course which will be Financial Analysis. Four classes will be held with K. G. Grimm, J. P. Holmes, P. D. Lee and R. M. Watkins as instructors. B. M. Dobbs was appointed "grader" for the four classes. Work will officially get under way on September 12 with classes held from 7 to 9 p.m. First semester will require 14 weeks to complete.

The Section Manager resigned as Financial Department representative on the Suggestion Board and L. P. Murray, Measurements Specialist, was appointed as replacement.

C. E. Cooke, Measurements Analyst, was appointed Financial Department representative on the Program Activities Committee of the Central Safety Council.

Arrangements were completed for the first group of 1955 Business Graduates who have received "Q" clearances to have a one day conducted tour of the areas. Seven will go on September 22, with K. F. Priest of the Manufacturing Department conducting the tour.

During a trip to Schenectady on August 22 and 23, the Section Manager contacted Measurement Services, Auditing Services, representatives of the Atomic Power Equipment Department and Financial Personnel Services.

Budgets

Principal efforts were devoted to completion of performance bogeys for all departments. This work was coordinated with the Measurements Specialists who made contact with their respective departments and sections and worked with Financial Representatives. The result was considerably more comprehensive and complete than that for previous years. However, work will continue throughout the year on additions and improvements.

Product Bogey Estimates were completed on schedule and were submitted with analysis letter to the Manager - Finance.

The FY 1956 Financial Plan was received by the Commission early in September but is not yet ready for analysis and reconciliation by our Section.

Measurements

Some improvement in the number of contacts were shown indicating a degree of increased interest by other departments and sections. Much is left to be desired.

Considerable work was devoted to the performance bogeys mentioned above and to study of three draft reports of findings by Company task forces on measurements. Key Result Areas 2, 3, and 4 were reported upon and were summarized for review by D. M. Johnson and W. E. Johnson.

CONTRACT COST SECTION
MONTHLY REPORT - AUGUST 1955

Effective August 1, 1955 Engineering Cost assumed responsibility from Plant Accounting for Minor Construction Major Equipment, Shop Equipment and Small Tools.

During the month considerable assistance was rendered Measurements in preparing additional performance bogeys for FY 1956.

Three new measurements for Electrical Utility Section performance were included in their monthly cost analysis. They are: (1) maintenance expense per mile of 230 KV line, (2) maintenance expense per mile of distribution line and (3) maintenance and operating expense per MVA installed transformer capacity. These unit costs will be included on all future cost analyses.

The July cost closing schedule was revised to permit one additional day for completion of cost reports, thereby eliminating much of the overtime normally required in meeting month-end cost closing dates.

Exempt personnel changes during the month were as follows: Effective August 1, 1955, R. E. Bush was promoted to the exempt roll and was assigned as Financial Advisor to Minor Construction Sub-Section with headquarters in White Bluffs. R. A. Connell was transferred to the 100 Areas as Financial Representative for the Reactor Section replacing G. T. Van De C. who transferred to the Home Heating and Air Conditioning Plant in Tyler, Texas. Effective September 1, 1955 R. E. Thomas will transfer from Auditing Section to replace R. A. Connell as Financial Analyst Product Cost.

Employee and Public Relations Cost Unit

The method of distributing leased line and toll call expense was reviewed and a brief procedure written. The review indicated that the major portion of the clerical work involved in recording these expenses was in the verification of the calls actually placed and that distribution of costs is accomplished by Telephone Unit employees as a part of the certification work and very little additional effort is required.

The annual Landlord Report for Community Section was completed and distributed. The Community Cost Sub-unit assembled the necessary information for this report from various sources and prepared it as a service to the Manager of the Community Section.

Engineering Cost

Physical inventory of Minor Construction Stores is now in process. Difficulty is still being experienced in conducting these inventories and reconciliations due to the recataloguing of stores which necessitates considerable physical movement to new locations. This physical movement is handicapped by lack of space and fixed size storage bins. However, progress is being made and it is expected that recataloguing and storage will be completed by year end.

Engineering Cost assumed the accounting responsibility for Minor Construction Small Tools from Plant Accounts on August 1. Procedures have been adopted to establish card record file in Minor Construction for the physical control and to facilitate inventories. Engineering Cost is reclassifying Small Tools into two classifications - Expendable and Non-Expendable: non-expendable tools to consist of all power, hydraulic and pneumatic tools, survey levels and transits; counter scales and platform scales; refrigerators; electric ranges; electric

water coolers, and refrigeration type air conditioners; all other tools and protective clothing to be considered as expendable. It is believed that this segregation will facilitate classification and furnish a definite line of demarcation for control purposes. As soon as reclassification is completed arrangements will be made for the annual physical inventory.

General Indirect Construction Expense for the period May 1, 1955 through July 31, 1955 is within forecast; however, the construction costs to which it is applied are running substantially under the forecasted level. As a result, by July 31, 1955 General Indirect Construction Expense was under liquidated by \$79,416. Discussions with representatives of the Project Section resulted in a decision to increase the rate of liquidation from 3% to 5% of total construction cost as of September 1, 1955. All future estimates for construction projects will include General Indirect Construction expense at the new rate.

Technology Costs' 300 Area Representative has completed preliminary work on establishing a work request authorization procedure for service performed by the Technology Sections for other departments. This procedure is currently in draft form waiting for review and approval, and will be put into effect as soon as this has been accomplished.

General and Consolidations Cost Unit

The FY 1956 Bogey for the Financial Department by Section was completed; together with unit cost statistics for Procedures and Computing Section and Personnel Accounting Section.

A review was made of Equipment Work In Progress billing procedures to determine what steps should be taken to be assured that all billings to Plant Accounts for such equipment have first cleared through the proper cost account. Plant Accounting is to initiate a letter stating that Plant Accounts should never be billed directly for equipment purchases nor will Plant Accounts accept any billing that had not first cleared through an E.W.I.P. cost account.

Manufacturing Cost Unit

Arrangements have been made by the Financial Representative to conduct cost information meetings for all new maintenance foreman of the Reactor Section. The first of these meetings will begin the second week of September and will include explanations of cost reports, Work Order procedures, coding time cards and other items of general interest.

Manufacturing Cost personnel assisted with the Annual Physical Inventory of Special Materials taken in the 100, 200 and 300 Areas.

A statement was made of Reactor and Separations Section salaries included in the FY 1956 Annual Goal to point out the relationship of Annual Goal personnel and costs.

Preparatory work was done for reporting Separations Power costs under one unit code. New account classification codes will be used to record 200 East and 200 West costs separate. Cost and Operating reports will be revised in line with this change.

Two meetings were conducted for supervision of Metal Preparations Section. A meeting for all supervision was held to explain the use of expense codes which have been established for all structures and major pieces of equipment. A meeting was also conducted for Project and Personnel Development Sub-Section to explain the accounting and budgeting procedures related to Construction Projects, Appropriation Requests and Informal Requests.

Discussions were held with Transportation Section personnel regarding the use of the new Operating Report form. A summary of explanation has been prepared to point out specific application and use of accounts for the Transportation Section.

GENERAL ACCOUNTING SECTION
MONTHLY REPORT--AUGUST, 1955

ACCOUNTS PAYABLE UNIT

Vouchers booked in Accounts Payable during the month numbered 4,470 and amounted to \$3,389,332. Although the number of vouchers was approximately 1,000 more than the number booked during July, it is consistent with the calendar year-to-date average.

Two additional General Clerk A's were assigned to Accounts Payable during the month and are being trained as Invoice Auditors. Total personnel in the unit as of August 31 was twenty-four, one under the budgeted level.

As a result of efforts in recent months, the backlog of paid invoices, covering engineered equipment for which final inspection and acceptance had not been completed, has practically been eliminated. Several months ago this backlog of paid vouchers which required formal certification that equipment was in accordance with specifications, comprised approximately 150 vouchers totaling \$700,000. At August 31, 1955, outstanding items number eight, totaling \$35,000. The recently established On-Site Inspection Unit has assisted materially in this work.

Active contracts handled by Accounts Payable, excluding requirements contracts, numbered 36 and contract commitments at the end of August amounted to \$996,891. Payments on these contracts in August amounted to \$56,194. Requirements contract orders placed during August numbered 14 in the amount of \$472,527, and commitments at end of month amounted to \$925,705. Payments under requirements contracts for the month were \$421,303.

Accounts Payable:	<u>August</u>	<u>July</u>
Balance at beginning of month	\$ 776 299	\$1 202 692
Vouchers entered	3 389 332	3 266 164
Cash receipts	131	1 356
	<u>4 165 762</u>	<u>4 470 212</u>
Less: Vouchers Paid	<u>3 463 453</u>	<u>3 693 913</u>
Balance at end of month	<u>\$ 702 309</u>	<u>\$ 776 299</u>
Number of vouchers recorded	4 740	3 778
Number of checks issued	3 203	2 980
Number of freight bills paid	1 718	1 252
Amount of freight bills paid	\$304 820	\$210 801
Number of purchase orders received	2 613	2 190
Amount of purchase orders received	\$1 926 701	\$2 163 824
Amount of cash discount earned	\$7 367	\$8 520

ACCOUNTS RECEIVABLE UNIT

The gross accounts receivable balance at August 31, 1955 amounted to \$270,200, a decrease of \$15,000 from the balance at July 31. The balances of all categories of accounts receivable decreased during the month with the exception of Kadlec Hospital, which increased \$10,000. This increase was due primarily to an increase in charges billed at the hospital due to an increase of 12% in the number of patient days.

At August 31, there were approximately 19,500 active accounts receivable. Charges during the month totaled \$584,000 and collections were \$599,000.

Other statistics pertaining to accounts receivable are summarized below:

<u>Account</u>	<u>Balance</u> <u>7-31-55</u>	<u>Net</u> <u>Charges</u>	<u>Collec-</u> <u>tions</u>	<u>Balance</u> <u>8-31-55</u>	<u>Active</u> <u>Accounts</u>
Kadlec Hospital:					
Active	\$ 82 539	\$ 55 991	\$ 45 708	\$ 92 822	1 577
Collection Agencies					
(71 Accounts)	7 379		294 -b)	7 085	
Electricity	32 313	54 491	60 985	25 819	4 046
Telephone	33 825	51 315	54 057	31 083	6 362
Sundry:					
Active	34 171	18 595	24 067	28 699	273
Collection Agencies					
(142 Accounts-a)	7 693	126	127 -b)	7 692	
AEC Cost-type Contractors	22 594	19 016	20 095	21 515	26
Rents	41 920	381 706	390 700	32 926	6 841
Equipment Sales to					
Facilities (1 Account)	20 940		349	20 591	
Safety Shoes	1 515	2 825	2 712	1 628	305
Loans to Employees					
(2 Accounts)	345		6	339	
Sub-total	285 234	\$584 065	\$599 100	270 199	19 430
Reserve for Bad Debts	33 657 cr.			34 463 cr.	
General Ledger Balance	\$251 577			\$235 736	

(a- Includes all utility and rental accounts.

(b- Includes commission retained by agencies.

ADMINISTRATIVE PLANNING

A total of 50 new or revised Organization and Policy Guides were distributed during August. Of these, 34 were Organization guides and 16 were Instruction or Policy guides. In addition, 27 OPGs were in the process of reproduction or distribution at month's end.

ADMINISTRATIVE PLANNING (Continued)

A revision to the OPG distribution system was made during the month. This change, which involves establishment of one copy as the minimum number distributed to each recipient, resulted in a reduction of 125 in the number of copies distributed -- with no reduction in over-all coverage. At a cost of about \$14 per copy per year, this involves a savings of approximately \$1700 annually.

Two complete OPG books were prepared and an additional 810 extra copies distributed to OPG holders.

The following Organization and Policy Guides are currently being revised and reviewed for possible revision:

04.1.3	"Research and Development"
04.4	"Assignment of Landlord Responsibilities"
04.5	"Property Management"
05.4	"Work or Expenditures Which Require AEC Reimbursement Authorization or Letter Approval"
13.15	"Disciplinary Action"
14.1	"Area Evacuation"
15.28	"Foreign Travel"
16.6	"Use of Private Automobiles on Official Off-Plant Trips"
17.1	"Policy on Travel, Living, Moving and Entertaining Expense"
18.2	"Absences and Tardiness"
18.14.4	"Induction of New Employees"
18.14.5	"Employee Transfer and Payroll Status Change"
19.2	"Grievance Procedure"
21.8	"Shipping, Receiving and Acceptance Procedures"

CONTRACT REIMBURSEMENTS

The July "Summary of Disbursements," transmitted to the Commission through the Chief of its Finance Division, covered disbursements of \$7,274,187, summarized as follows:

Payrolls and Payroll Deductions Disbursed	\$4 735 264
Materials (including payments on requirements contracts) and Freight	2 090 346
Subcontracts and Agreements	55 600
Advances for Traveling and Living Expenses	68 253
Miscellaneous	<u>628 576</u>
Gross Disbursements	7 578 139
Less: Revenue	<u>303 952</u>
Net Disbursements	<u>\$7 274 187</u>

In preparing this report, a review was made of each of 266 items which comprised "Miscellaneous" to establish their propriety, while all other expenditures were analyzed, classified and summarized to disclose the nature of all disbursements made by HAPO during the month.

CONTRACT REIMBURSEMENTS (Continued)

Net charges against the Overhead Allowance in August were \$4,094, consisting of: conference expense (entertainment), \$1,719; expenses of employee transferred to Washington, D.C., to an assignment with the Commission, \$1,130; travel and living expense variation, \$877; non-reimbursable travel expense in connection with interview trip of prospective transferee, \$385; purchase of trophy for Atomic Frontier Days award, \$71; telephone calls not directly related to HAPO business, \$7; and credits of \$60 to correct a charge made last month for non-reimbursable transfer expense, and \$35 to reflect an adjustment on the cost of newspaper advertising.

Because the new contract will cancel all of the Commission's approvals under the old contract, a review is being made currently of all approval letters obtained from the AEC in accordance with OPG 05.4 from the inception of the contract up to the present time. In every case in which the AEC's approval must be obtained under the provisions of the new contract, it is intended to resubmit these letters to the Commission.

GENERAL BOOKS UNIT

Refund in the amount of \$53,335.71 was received during August from the State of Washington Department of Labor and Industries to adjust the General Electric Pension Award Reserve Account to a balance of \$389,622 at October 1, 1954. This balance is the required reserve amount for Pension Award Claims at that date in accordance with the annual review of the State Insurance Commissioner's office.

Arrangements were also made with State Department of Labor and Industries to have the Warrant Register for the Pension Award Reserve Account completed and forwarded to General Electric Company as soon as possible after the fifteenth of the month, the date that the pension warrants are prepared. This will enable the booking of disbursements from the account during the current month.

Travel and living expense reports processed during August totaled 228. This includes 31 reports for conference expense, 18 for attendance at meetings and 179 for other Company business. A change was made in preparation of the Travel and Living Expense report which permits this report to be issued approximately four days earlier each month. Individual expenditures, which have been listed alphabetically, are being listed chronologically as they are booked. This makes it possible to record the data daily on the report and, after booking of the final expense report in the month, the Travel and Living Expense report is near completion.

Budget for attendance at meetings of professional and trade societies for fiscal year 1956 was approved by the General Manager, and Department Managers were notified of the amounts allocated.

GENERAL BOOKS UNIT (Continued)

	<u>August</u>	<u>July</u>
Advances from AEC		
Balance at beginning of month	\$2 423 551	\$ 1 747 738
Advances received from AEC	6 000 000	7 950 000
Other cash receipts	394 929	303 952
	<u>8 818 480</u>	<u>10 001 690</u>
Less disbursements	<u>6 738 680</u>	<u>7 578 139</u>
Balance at end of month	<u>\$2 079 800</u>	<u>\$ 2 423 551</u>
Advances requested for subsequent month	<u>\$6 800 000</u>	<u>\$ 6 000 000</u>
Travel and Living Expenses		
Travel Advances to employees		
Balance at beginning of month	\$ 54 075	\$ 12 619
Advanced to employees	72 447	68 636
	<u>126 522</u>	<u>81 255</u>
Less:		
Travel, living, and conference expenses reported by employees	50 391	21 141
Cash refunded by employees	7 786	6 039
	<u>58 177</u>	<u>27 180</u>
Balance at end of month	<u>\$ 68 345</u>	<u>\$ 54 075</u>
Outstanding Travel Advances to Employees		
Current	53 168	52 069
Outstanding over 30 days	<u>15 177</u>	<u>2 006</u>
Total	<u>\$ 68 345</u>	<u>\$ 54 075</u>
Number of expense reports submitted by employees	228	97
Works Cashier's Office		
Number of Receipts Issued	<u>11 478</u>	<u>11 005</u>
Bus System Operations		
Cash collections: Village	\$ 431	\$ 378
Area	\$ 8 472	\$ 7 092
Tickets: Value of tickets sold	\$ 600	\$ 400
Number of tickets sold	12 000	8 000
Number of tickets collected	<u>10 343</u>	<u>8 568</u>
Cash Overages and (Shortages)		
Number	7	6
Amount	\$.94	\$ -0-

PERSONNEL ACCOUNTING SECTION
MONTHLY REPORT - AUGUST, 1955

Participation in the Savings and Stock Bonus Plan has increased by 601 employees since June 27, 1955 when the mid-year membership drive began. This has raised plant-wide participation in this plan from 47.8% to 52.9%.

Four annuity certificates issued by the Connecticut General Life Insurance Company were delivered to former duPont employees who transferred to General Electric Company at Hanford on September 1, 1946. The delivery of these certificates during the month of August brings the total number of certificates issued to 129.

Copies of routine formal reports issued by the Payroll Reports Unit for use by the AEC, local or general company management were submitted to the Budgets and Measurements Section. These reports are being gathered for submission to Schenectady where they will be studied for possible improvement.

A new check signer for use in Weekly Payroll Unit was received during August. This new signer has an automatic feed which will speed up the signing of checks considerably. The old check signer was replaced because of age and obsolescence.

Office Letter No. 213 covering the plant closing on the Labor Day holiday and the payroll time cards and check delivery procedures for the holiday week was issued on August 25.

A new time recorder was placed in operation for use of the Purchasing and Stores Section, Manufacturing Department. The installation of this time recorder brings the total number of time recorders in operation within the 300, 700, and 1100 areas to 47.

STATISTICS

Personnel Accounting Section

<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	9 318	2 283	7 035
Additions and transfers in	114	6	108
Removals and transfers out	(115)	(36)	(79)
Transfers from weekly to monthly payroll	-	12	(12)
Transfers from monthly to weekly payroll	-	(2)	2
Employees on payroll at end of month	<u>9 317</u>	<u>2 263</u>	<u>7 054</u>

	August			July		
<u>Overtime Payments During Month</u>	<u>Number</u>	<u>Amount</u>		<u>Number</u>	<u>Amount</u>	
Weekly Paid Employees	6 520	\$127 932	-a)	8 446	\$180 122	-b)
Monthly Paid Employees	411	33 762		375	24 361	
Total	<u>6 931</u>	<u>\$161 694</u>		<u>8 821</u>	<u>\$204 483</u>	

	<u>August</u>			<u>July</u>	
<u>Gross Payroll Paid During Month</u>					
Engineering	\$ 769 223			\$ 821 637	
Manufacturing	2 476 382			2 982 294	
Other	1 137 378			1 332 053	
Total	<u>\$4 382 983</u>	-a)		<u>\$5 135 984</u>	-b)

- (a- Payments to weekly paid employees are for four week periods.
(b- Payments to weekly paid employees are for five week periods.

<u>Employee Benefit Plans</u>	<u>Number Participating</u>		<u>Percent Participation</u>	
<u>Participation in Benefit Plans at Month End</u>	<u>August</u>	<u>July</u>	<u>August</u>	<u>July</u>
Pension Plan	8 134	8 131	98.5%	98.5%
Insurance Plan				
Personal coverage	9 262	9 263	99.4	99.4
Dependent coverage	6 560	6 566	-	-
U. S. Savings Bonds				
Stock Bonus Plan	4 926	4 846	52.9	52.0
Savings Plan	1 059	1 093	11.3	11.7
Both Plans	5 423	5 377	58.2	57.7

	<u>August</u>	<u>July</u>
<u>Pension Plan</u>		
Number retired	6	1
Number who became eligible for participation	87	100
Number who applied for participation	81	98
Number who elected not to participate	6	-
Replies not received	-	2
 <u>Insurance Plan - Number of Claim Payments</u>		
Employee Life Insurance	2	6
Employee accident and health insurance	431	419
Dependent accident and health insurance	520	441
Total	<u>953</u>	<u>866</u>
 <u>Good Neighbor Fund</u>		
Number participating	6 546	6 567
Percent of participation	70.3%	70.5%
 <u>Suggestion Awards</u>		
Number of awards	181	97
Total amount of awards	\$3 955	\$2 025
 <u>Preferential Rates</u>		
Number (eliminated) or added	(2)	(3)
Number currently in effect	537	539
 <u>Number of Military Allowance Payments</u>	2	4

PROCEDURES AND COMPUTING SECTION
MONTHLY REPORT - AUGUST 1955

GENERAL

The first major program, weekly payroll, was cut over to the 702 this week for the pay period ending August 21, 1955. Conversion had been delayed because of air conditioning trouble and later machine trouble. The latter problem was the appearance of stray bits in memory. When located, the source of difficulty was not memory itself, but a poor ground connection in the console, which caused a feed-back in the power supply.

The payroll as well as all payroll reports were run on the 702 for this August 21 pay period. Parallel operations for the periods August 7 and August 14 had been run to test the system, prior to the actual conversion. Other applications will be converted to the 702 as soon as possible and should be made with greater ease, because of the experience gained on the payroll conversion.

The need for a high-speed sorting routine for the 702 EDPM has become evident. In a recent problem in which corrosion losses of all Hanford process tubes were computed, approximately 3/4 of the total running time was spent in sorting the computed results for output, using the standard sorting routine furnished by IBM. Another problem, a three-dimensional pile control problem, requires the generation and sorting of some 50,000 quantities. Use of IBM's sorting routines would make this problem economically infeasible. To overcome this basic difficulty, the development of an improved sorting routine has been undertaken. Features of this routine include the use of six tape units, instead of the present four, to increase running speed, and the ability of the programmer to specify record groupings on tape, both before and after the sort. Programming of the routine has been completed and debugging is presently being carried out. The routine will be written and ready for use by the second week in September.

The contract for the Addition to the Records Center was awarded to Lewis Hopkins Company on August 11, and preliminary work has begun.

The revised File Manual was issued on August 15, 1955.

PROCEDURAL ANALYSIS

Forms control reviewed 389 orders during August covering 1,051,645 forms; 23 orders, amounting to 126,575 forms, were rejected; 103 new forms were designed.

Work is progressing on conversion of Plant Accounting property records on machine tools to paper tape. The new custodian's record, which has been designed for production from converted Plant Accounting records, will meet the dual requirements of Plant Accounting and Property Management. The new form consists of four parts, incorporating a number of innovations and advantages which will serve to facilitate and improve record maintenance. All of the plant records in the machine tool category have been transcribed on to the new history record form. Tap to card processing is progressing together with the development and revising of procedure manuals covering instruction and operation of the model 884 typewriter tape punch and the model 046 tape to card machine.

Conversion to EDPM of APV's and Store Order punched card procedures, as well as Radiological Measurement Evaluation continued during August.

The Motor Vehicle Reports were converted to EDFM and testing on the 702 is nearing completion for cutting over to EDFM processing.

The systems and logic work for conversion of present EAM processing of Classified Files daily activity was completed during August. Detailed programming, debugging and testing remain to be done.

A lecture series, sponsored by Procedural Analysis Unit, covering Industrial Engineering "Common Language Tools" was given to 171 HAPO employees during August by W. F. Engesser, Professor of Industrial Engineering, Oregon State College. A 50-page outline of techniques studied in the course was distributed to all participants. Examples of each working tool are supported by specific reference material. Objective "Follow-Up" procedures have already been initiated by the Plant Engineering Section Group (97 people) and Procedural Analysis Unit (11 people). Follow-up techniques for others in Financial Department (48 people) and Classified Files (15 people) have not yet been determined.

As a result of micromotion study made of keypunch operations in Computing Scheduling Unit, a comparison chart has been developed for use by the keypunch supervisors in developing time standards. A significant and useful by-product of this study was the disclosure of improper functioning of key punch machines on programmer skips. Time lost because of malfunctioning of equipment normally would not be noticeable without employing the micromotion film technique, but is of enough significance to pick up several minutes on average sized key punch jobs after the trouble has been detected and corrected by IBM Customer Engineers.

RECORDS OPERATIONS

Quantity of Records received, processed and stored:

Employee and Public Relations Department	30	Standard	Storage	Cartons
Engineering Department	74	"	"	"
Financial Department	136	"	"	"
Manufacturing Department	125	"	"	"
Radiological Sciences Department	<u>96</u>	"	"	"
	461			

Records Retention and Disposal Schedule Number 217, "Power Operations Records", consisting of twenty-eight individual records was developed and submitted for internal approval.

Microfilming of vital records was started August 8, 1955, by Recordak Corporation under Special Agreement G-64. Forty-five reels of microfilm consisting of 200,139 images have been completed by Recordak Corporation during August.

NUMERICAL ANALYSIS

Report is included in Secret Document HW-38828-W.

COMPUTING OPERATIONSPROCEDURES & COMPUTING SECTION

During the month of August the following non-routine assignments were completed for customers:

Employee and Public Relations	6
Engineering	10
Financial	23
Manufacturing	3
Operations Research	3
Radiological Sciences	2
	<u>47</u>

Service charges for the month amounted to \$50 540.64. Services, by customer, were as follows:

Atomic Energy Commission	\$ 162.64	00*
Employee & Public Relations	1 121.90	01
Engineering	11 967.91	12
Financial	25 500.02	75
Manufacturing	1 715.17	02
Operations Research	8 713.95	09
Radiological Sciences	1 353.05	01
	<u>\$50 540.64</u>	<u>100</u>

* Less than 1%

PROPERTY ACCOUNTING SECTION
MONTHLY REPORT - AUGUST 1955

PLANT ACCOUNTING UNIT

A physical inventory of 200 Areas' uninstalled equipment was started August 16, 1955. Except for specialized equipment, the inventory covers all uninstalled (defined as movable equipment) equipment, including operational spare instruments. Also included are many items previously classified as uncataloged plant which currently have been reclassified as cataloged items to be individually accounted for. At month end the inventory was 95% complete. Eight Plant Accounting personnel were active in the inventory, comprising four permanently assigned personnel and four withdrawn from other active plant accounting programs.

Posting of June 1955 business to detail records was completed except for 100-K Area and Purex Unitizations. It is estimated the two unitizations will not be completely posted to detail records until December 1955.

Reconciliations of physical inventories of mobile equipment and office machines are 35% and 95% completed, respectively.

During the month, 163 Declarations of Excess and 121 Property Disposal Requests were processed; transfers effected 1100 changes to plant record cards, and 300 new cards were issued to Property Custodians. A total of 143 control cards were received from Property Custodians stating they were unable to account for or locate these items. Further investigations are necessary.

A listing of ranges and refrigerators was started during the month, which includes individual descriptions and identifications, as well as residence location. This is required in connection with the transfer of items from uncataloged to cataloged plant. Current listings are being prepared by Community Section and require an estimated 200 man-hours to complete. To establish individual records in Plant Accounting will require an additional 1225 hours, or 153 man-days.

The recording of 829 machine tools by use of typewriter tape punch machines was completed and tapes were transmitted to Procedures and Computing. Punched cards are being prepared from the transmittal tapes with approximately 70% completed to date. The initial recording is progressing rather slowly since operating procedure for the typewriter tape punch machine and tape to card machine must be altered to eliminate unforeseen problems or operating difficulties. Although motor vehicles, heavy equipment, railroad rolling stock, and office machines are ready for conversion to IBM, work will not start until the trial application of machine tools has proven satisfactory.

Unitization reports for 100-K Area and Purex facilities were distributed during the month. A total of 905 man-weeks was expended to complete these unitizations, segregated as follows (excludes reproduction, assembly, and incremental time):

PLANT ACCOUNTING UNIT (Continued)

	Man-Weeks		
	<u>100-K</u>	<u>Purex</u>	<u>Total</u>
Personnel assigned to:			
General Electric Co.	152	76	228
Kaiser Engineers	412	43	455
Blaw-Knox	-	222	222
Total Man-Weeks	<u>564</u>	<u>341</u>	<u>905</u>

A cost summary report was prepared for 100-K facilities for inclusion in the unitization report which summarized cost to date and estimated completion costs as follows:

KE Facilities	\$68 149 003	
KW Facilities	68 779 406	
Facilities Serving KE and KW	5 483 612	
Research Facilities	2 448 039	
General Facilities	2 021 587	
Graphite Fabrication Facility	<u>4 234 069</u>	
Total Costs Unitized		\$151 115 716
Estimated Costs to Complete		
General Electric	5 647 539	
AEC	<u>199 076</u>	
		5 846 615
Proposed Charge-Discharge System		<u>5 500 000</u>
Total Estimated Cost of Project 512		<u>\$162 462 331</u>

Costs applicable to uninstalled equipment are being reallocated within the 100-K unitization in order to reflect realistic values of such equipment. The preparation of detail records will be completed in approximately five weeks for the uninstalled equipment. Approximately 350 items require tagging prior to preparation of detail records.

Total projects unitized during FY 1955 were included in a report issued during the month, summarized as follows:

	<u>No. Unitized</u>	<u>Value</u>
Projects over \$20,000	42	\$175 877 764
Projects \$5,000 - \$20,000	16	177 236
Projects under \$5,000	<u>15</u>	<u>30 388</u>
Total	<u>73</u>	<u>\$176 085 388</u>

PLANT ACCOUNTING UNIT (Continued)

Other project unitizations completed during the month were:

CA-431-C	Metal Examination Facilities	\$520 262
CA-532	Water Tank Replacements	94 308
CG-553	Outlet Tube Temperature Monitoring System	<u>45 700</u>
		<u>\$660 270</u>

Two and one-half man-months were expended in completing a Report of Federal Real Property at the request of AEC. The report will be required by the General Services Administration annually, at each fiscal year ending, and includes the following summation:

	<u>No. of Bldgs.</u>	<u>Floor Areas Square Feet</u>	<u>Recorded Cost In Thousands</u>
Buildings			
Office	38	271 475	4 001
Hospital	1	63 795	1 139
Institutional (Richland Library)	1	9 250	151
Housing	5 001	5 333 470	50 351
Storage	118	720 975	6 391
Industrial	194	3 328 273	246 810
Service	<u>348</u>	<u>952 953</u>	<u>14 478</u>
Total Buildings	5 701	10 680 191	323 321
Other Structures and Facilities			
Structures			34 236
Facilities - Includes all systems of non-process nature, i.e., Electrical Distribution, Railroad, Sanitary Sewer, Steam Generating, Community Water, etc.			92 900
Improvements to Land			<u>30 806</u>
Total Other Structures and Facilities			<u>157 942</u>
Total Real Property Reported			<u>\$481 263</u>

Irradiation facilities in 100 B, D and F Areas were completely depreciated during the month of August. It has been apparent for some time that our depreciation rates on irradiation facilities were excessive and we have submitted two formal proposals to AEC requesting permission to make necessary revisions. To date, no indication of approval or disapproval has been received. Temporarily, depreciation on the 100 B, D and F reactors will be continued even though it results in over-depreciation. This action has been taken and revised depreciation forecasts have been submitted.

INVENTORY ACCOUNTING UNIT

Physical inventory of special materials, excluding graphite, was conducted on August 24, 25 and 26. Material inventoried included platinum, silver, gold, palladium, beryllium, and zirconium in the custody of Manufacturing, Radiological Sciences, and Engineering Departments. These metals were physically located in nine areas in custody of 121 holders. The reconciliation of the physical inventory value with the book value is in progress and the final results should be reported in September.

The physical inventory of general supplies in the custody of the Community Section was conducted on August 30 and 31. The material inventoried was physically located in three locations and included 27 service trucks. The reconciliation of physical value to book value is in progress and the final results should be reported in September.

Several pre-inventory meetings were held with Stores personnel to formulate plans, establish dates, and discuss preparatory work for taking the third annual physical inventory of general supplies. The physical count of general supplies will be conducted on September 29 and 30 with the following exceptions: medical supplies September 23 and automotive and heavy equipment parts are to be included in the inventory cycle as a separate inventory. IBM equipment will be used to pre-write from stores catalogues approximately 21,000 of the 30,000 inventory cards required. In the past these cards have been hand written from Stores perpetual inventory records. Catalogues and IBM inventory cards have been forwarded to Procedures and Computing Section for preparation.

Effective September 1, 1955, freight expense will be allocated to the applicable material when practicable. This allocation will be made by Stores who will submit a schedule of monthly allocations to Inventory Accounting for proper booking. Amounts not allocated to the applicable material will be charged to Stores operating costs.

PROPERTY MANAGEMENT UNIT

Evaluation of the Property Management Practices of the plant continued throughout the month.

Assistance was given HOO in a study of the machine tool requirements required by AEC in the event of mobilization. Data for all federal agencies are being compiled by the Office of Defense Mobilization.

The proposed new prime contract carries a provision which states that reimbursement is allowed for costs of small tools and work clothing furnished with the approval of the Commission, by the Contractor to its employees for use in the performance of the work. OPG 04.7, which covers the issue and control of protective clothing and equipment, has been reviewed and revised in the light of the above paragraph. An OPG covering small tools is in process of preparation.

The question of the personal use of government property by individuals has been reviewed with the Plant Protection Section. OPG 04.5 has been revised to include specific prohibition of such use. The Plant Protection Section has agreed to elaborate on this subject in one of their Security Bulletins after the OPG is published.

PROPERTY MANAGEMENT UNIT (Continued)

Seventy-six requests for the disposition of property were investigated and disposal instruction issued during the month. Some items of interest were:

The nine quonset huts (known as the 722 Area) previously occupied by the Community Operations Sub-Section on the Knight Street side of the 700 Area, will be sold in place. The removal of these huts should materially improve the appearance of this portion of the 700 Area.

Four contaminated fork lift trucks were retired by burial. These pieces of equipment were part of the original facilities of the plant and were worn beyond repair. They were replaced with items obtained through the AEC up-grade program.

A jumper jig obtained by the 200 Area from Blaw-Knox was disposed of as salvage when it was found that it was not feasible to use same for its intended purpose.

Tract house O-1224, just south of the Columbian Club will be sold in place. The house is in the proposed street right-of-way.

Twenty-one appropriation requests totaling \$80,562 were investigated, processed and approved during the month.

APPROPRIATIONS UNIT

During the month study was directed to the revised practices which may be dictated by the Plant and Equipment Appropriation for FY 1956. The problem of obligating funds for plant and equipment has received the most attention. The implications of the legislation have been reviewed and summarized and the Legal Department has been asked for an opinion as to whether the appropriations for FY 1956 must be considered as specific appropriations and the degree of responsibility incumbent upon GE to ascertain the current status of appropriated funds. Upon determining the extent of GE's responsibility, revised procedures for authorizing projects, obligating project funds, and controlling expenditures within obligational limits will be established. Several alternative procedures are under consideration. Final selection cannot be made until a legal interpretation of our position with respect to reimbursement for project expenditures is firmed up.

In meetings with the representatives of the Manufacturing and Engineering Departments, attention has been directed to the need for firming up data sheets for FY 1957 budget items to meet the requirements of the revised practice of specific authorization by projects rather than the past practice of general appropriations by Congress. It has been pointed out that all possible effort should be directed to providing the necessary back-up information for projects which are critical to the HAPO production goal forecasts for fiscal year 1957. Also, it has been recommended that General Plant Projects which cannot be accomplished during FY 1956 be firmed up and submitted as line items for addition to the FY 1957 budget prior to October 15, 1955.

APPROPRIATIONS UNIT (Continued)

During the month three project planning meetings were held with representatives of the Engineering Department and three were held with Manufacturing Department representatives. Projects reviewed for scope, justification, and cost included:

Building 221-U, Section 9 - Conversion to Intercycle Concentration

TBP Plant Product Tail-End Treatment

Redox Capacity Increase, Phase III

Zone Temperature Monitoring - 100 B, C, D, DR, F and H

Design of Continuous Charge-Discharge Equipment

Seven project proposals and two informal requests representing an aggregate of \$2,950,000 were reviewed, approved, and processed to the Commission during the month.

After receipt and analysis of AEC directives and work authorities, fourteen project authorizations were issued for a total of \$12,766,500.

APPROPRIATIONS UNIT (Continued)

The following Plant and Equipment projects were processed through the Appropriations Unit during August. GE and AEC approval action was as indicated below.

Project Number	Title	Amount of This Request	Total*	Date to AEC	Disposition
CA-512 PRP 4	1952 Hanford Expansion - 100-K Area Facilities	\$ 2,000,000	\$28,210,000**	8-23-55	Work Authority in process
CA-513 PRP 9	Expansion of 200 Area Facilities - Purex Modifications, Phase I	3,100,000	3,100,000**	7-13-55	AEC-64 dated 8-11-55 authorized AEC \$1,500,000. Work Authority dated 8-11-55 authorized GE \$1,212,000. Work to be accomplished by CA-513-E
CA-513 PRF 10	Expansion of 200 Area Facilities	300,000	8,272,000**	8-31-55	Work Authority dated 8-31-55 authorized GE \$200,000. Work to be accomplished by CA-513-E. GE authorized funds: CA-513-A, B, C, and D - \$7,972,000; CA-513-E - \$1,412,000
CA-548 Rev. 1	New VSR Tower	125,000	125,000	7-25-55	Forwarded AEC-Washington for approval 8-11-55
CG-558 Phase II	Reactor Plant Modifications for Increased Production	11,200,000	11,200,000	6-27-55	HW-358 dated 8-11-55 authorized GE \$11,200,000
CA-590 Rev. 2	Fly Ash Collection Equipment - 384 Building	40,000	40,000	8-23-55	AEC Agenda 9-8-55
CG-500 Rev. 1	100-C Alterations	275,000	1,000,000	8- 5-55	Forwarded AEC-Washington for approval 8-11-55
CA-501 Rev. 1	General Grounds Improvements - 300 Area	96,000	96,000	2- 7-55	AEC-61 dated 8-15-55 authorized AEC \$60,000
CG-514 Rev. 2	Hanford 4X Program - 300 Area	-	-	8-23-55	Change in method of performing work AEC Agenda 9-8-55
CA-515	Mechanical Maintenance Shop Centralization - 100 Areas	92,000	92,000	7-18-55	Returned by AEC-Washington 8-26-55 for further justification of engineering costs
CG-616 Rev. 2 H	Installation of Acid Feed Equipment, 100-B, D, DR, F, and H	285,000	470,000	8-25-55	AEC Agenda 9-8-55

<u>Project Number</u>	<u>Title</u>	<u>Amount of This Request</u>	<u>Total*</u>	<u>Date to AEC</u>	<u>Disposition</u>
CG-630	Alterations to Minor Construction Shops - White Bluffs	\$ 93,000	\$ 93,000	7-25-55	Returned by AEC-Washington 8-26-55 for further justification of engineering costs
CG-633	Kadlec Hospital Alterations	29,400	29,400	7- 7-55	To be authorized from 1956 funds
CG-634	Replacement of Redox 216-S-1 and 2 Crib	95,000	95,000	7- 6-55	HW-360 dated 8-26-55 authorized GE \$20,000 for design and critical procurement
CG-635	Redox Stack Particulate Sampler	50,000	50,000	8- 1-55	HW-359 dated 8-26-55 authorized GE \$40,000
IR-171	Installation of Automatic Bar Screens	-	-	8- 9-55	Extension of Completion Date approved 8-19-55
IR-187	Protective Screens for Central Viewers - 105-C, DR, and H	-	-	8- 9-55	Extension of Completion Date approved 8-19-55
IR-191	Building 321 - Fire Protection	19,000	19,000	7- 1-55	Approved 8-15-55
IR-198	Redox Stack Spray Piping Modification	15,500	15,500	7-25-55	Approved 8-15-55

* Total previous authorizations plus this request

** GE funds only

SS ACCOUNTABILITY SECTION
MONTHLY REPORT - AUGUST, 1955

Metal Preparation Area - SS Accountability Unit

For the past several months one of the most complex SS Accountability problems has been presented by the cored slug program. This material form now constitutes one of the production items of the Metal Fabrication Section. The program has been subjected to innumerable process changes.

During August, a mid-month change in process involved the use of aluminum in lieu of normal uranium inserts for both drilled and extruded slugs. This resulted in unusual month-end inventory conditions. Practically every balance area in the process was confronted with multiple slug types and weights.

While the present status of the cored slug program presents unusual problems, even greater difficulties are anticipated in the Reactor Areas at the time of process use. Here the problem is one of facilities for control of multiple slug types and varying weights. Difficulties are anticipated in that present schedules call for use of material prior to the availability of the 702 EDPM for tube by tube control. Work load difficulties are anticipated and are under current investigation.

Further reduction of normal uranium bearing materials was accomplished in the preparation and shipment of approximately 22,000 pounds of tin, used bronze, and copper-tin crystals. These materials represented accumulations from prior slug canning processes and were no longer required at this site. Shipment was made to National Lead of Ohio - an A.E.C. contractor.

Approximately sixty tons of D-38 material has been received and canned by the Metal Preparation Section. This material is for use in Purex cold run start-up. Approximately forty tons of normal uranium in the form of canned reject slugs originally scheduled for use in Purex are being stripped for return to UM scrap for offsite shipment.

Reports from the Metal Preparation Section indicate that return to the dip method of pickling may be required due to unsatisfactory performance of the spray type method. This presents SS Accountability problems in that non-uniform normal uranium losses to the pickle bath have been encountered. Redetermination of the loss factor is under current review.

We have devoted considerable time and effort to the problem of custodian control with specific reference to the functions of the Fuel Technology Sub-Section and the Radiometallurgy Unit. Both components are now changing over to a location chart control in which geographic location, quantity, basis of inventory, and use are related. This form has been proposed by the SS Accountability Section and accepted by the custodians. In both cases discrepancies were found to have been due to the method of records procedure and the cases have been closed.

A revised transfer form has been devised and approved by Forms Control. It is now in the process of reproduction. Under maximum adaptation there will be a 10 to 1 reduction in the number of forms. Application is currently waiting on a supply of the revised form which should be in use prior to October 15, 1955.

SS Accountability Section
Monthly Report - August 1955

The first in the current series of five shipments of mint program material was made on August 30, 1955. Subject to the return of containers on schedule, the program will be completed by December 31, 1955.

Reactor Area - SS Accountability Unit

An audit of SS Accountability Section records and routines started on August 5th covering Reactor Area controls. Approximately ten days were spent in review following which the auditors transferred activities to the Separations Area functions. G.E. Internal Audit is conducting the review.

The assumption of responsibilities by the Reactor Area - SS Accountability Unit has been on a priority basis. It is currently on schedule. During August, preparations were made for the assumption of control of two factors previously serviced by other units within the SS Accountability Section. The first item, that of burnout of uranium due to Pile operation will be calculated in the Reactor Area Unit as of September 1, 1955. In addition control accounts for normal uranium in the Reactor Areas are now a responsibility of the SS Accountability Unit in that area.

Further improvements in Reactor Area control accounts have been installed for basin liner - hold-up. This is a repetitive operating difficulty due to the lodging of irradiated discharged slugs in inaccessible locations. Under the control system the all important piece count control may now be maintained.

Separations Area - SS Accountability Unit

The accounts record numerous revisions from previous recorded transfer values for intra-plant movements due to production scheduling and were as follows:

1. Redox
Operated on "low" material. Production rates were stepped up following the initial conversion from "high" material. Higher levels of through-put were maintained for the last half of August.
2. TBP
Successful blending of old and new material resulted in a more satisfactory control of gamma contamination. As a result, the use of the Redox silica gel system for TBP material was discontinued.
3. Recuplex
On recovery of "high" powders, fragments and metal recovery solutions, the schedule calls for a substantial inventory reduction of this type material by October 15, 1955.
4. Metal Fabrication
Operated on "low" material.
5. Purex
Cold run using D-38 not as yet firmly scheduled. Some delay in use may develop pending process review. A Purex Flow Chart for SS material control purposes has been completed and is now in reproduction.

SS Accountability Section
Monthly Report - August 1955

Evaluation activities directed towards the Material Underaccounted For status were conducted and the following action taken:

Redox

M.U.F. resulted from the substantial adjustment made following the dissolver cleanouts. This is a cycle operation with the adjustment related to the throughput since last cleanout. The temporary shutdown enabled us to re-calibrate the dissolver heels and this correction should reduce future adjustments at the time of subsequent cleanouts.

Task I and Task II

Overaccounted for material was assignable to the substantial hydrofl~~uorination~~ cleanouts recovered during the month. Improved inventories are required; however, holdup of material by process facilities renders the material unmeasurable and there are serious limitations to the feasible controls.

TBP

Recalculation and discovery of error in the dished portion of the WR-004 Feed Tank should improve the material balance across this process. The WR-004 tank transfers control the major charges to the TBP process. The correction is consistent with the records and should materially improve the over-all balance.

SS Accounting Unit

A letter was received from HOO-AEC requesting use of revised standard Composition of Ending Inventory forms for the Material Balance Report. This was the second revision asked for by the Commission with the exception of the Normal Uranium for which standard forms were instituted for the first time.

Approval was obtained in a letter dated August 10 to enter Normal Uranium Factor Weight Differences as Material Unaccounted For.

The Section devoted considerable time to Security problems involving numerous items. In conjunction with Security, a procedure was instituted for the document classification of review working papers. With respect to other matters, however, we were confronted with conflicting regulations which were only resolved by the establishment of exception procedures approved by Security. Due to the restrictions imposed the projects cannot be defined.

Review of the SS Accountability accounting records at the 231 Building has been completed. A summary report for purposes of discussion is in process of ~~preparation~~.

Close cooperation is being maintained with HOO-AEC in connection with the reconciliation of physical inventories of Plutonium witnessed as part of HOO-AEC Survey 12 at the end of July.

SS Measurement Unit

A recommendation by the SS Measurements Unit that waste uranium credit be adjusted by the analytical bias has been accepted by the Analytical Sub-Section custodian at Redox and Metal Recovery. The first adjustment will be made at the end of August.

SS Accountability Section
Monthly Report - August 1955

An Am-Cm correction of 0.25% for 260 MWD/T dissolver solution was computed from the analyses of 83 Redox and T-Plant batches. This factor is being incorporated into Redox and T-Plant procedures, eliminating the Am-Cm analysis for material of this exposure level and of average cooling time.

As the result of adopting new calibrations for the displacement measurement of dissolver heel, Redox had a four ton uranium shortage in July. This indicates that the good balances in recent months have been due to overstatement of the ending inventories and that unmeasured losses from the dissolvers are still occurring, perhaps in the coating wastes. In the coating waste study, the Analytical Sub-Section has demonstrated that unmeasured loss is a definite possibility. We are now placing a quantitative determination of this loss by bench scale study.

A letter requesting action on weight factor manometer problems was prepared for distribution to TBP Plant personnel.

Bismuth Phosphate inventory procedures are being discussed with Operations. SS Measurements Unit's procedures are being used as the basis for the necessary forms. A trial month-end physical inventory is scheduled for September.

Two reports have been submitted on the subject of U-235 calculations in depleted uranium through separations plants. One of these streamlined the present procedures and included a new procedure for Purex. The other report concluded that U-235 M.U.F. across UO_3 plant should not necessarily be in proportion to uranium M.U.F. because the bases of charge and credit of U-235 across UO_3 are different.

Metal Fabrication Manual has been revised and will be issued shortly.

Concurrence of inventory procedures have been established with Recuplex Operation. Forms and procedures have been completed and approved, however, they will not be issued until the startup period is over. The inventory will be largely measured.

Discussions are being held with Z Plant Process, Separations Technology personnel concerning the reduction in sampling frequency or use of a factor on caustic scrubber solutions in Recuplex.

A detailed report was submitted on Recuplex measurements and precisions. The latter were incorporated into the control limit calculations for July material balances.

Major inventory problems have developed in 234-5 Building. The Recuplex extraction inventory is largely estimated and is extremely imprecise. In Tasks I and II, clean-ups have recovered over 11 kgs. of powders estimated to contain 2.4 kgs. of plutonium. This is material which did not appear on the July 1 inventory.

In a discussion with Process Control, Separations Section, it was agreed that although the skull factor in use during April through June apparently was biased low, no action on revising it would be taken because of the probability that the condition causing the factor shift would soon be alleviated. Since then, metal recoveries have shifted in the opposite direction. However, the present loss trend is probably the result of heel buildup and not a change in the skull factor.

A method for calculating mint decay and arriving at proper shipper figures on target and pile flattener has been submitted.

SS Accountability Section
Monthly Report - August 1955

Requests were submitted to Separations Area - SS Accountability Unit, for faster reporting of M.U.F. at month-end, and for weekly reporting of M.U.F. across 231 and Task I. This problem will resolve itself as soon as difficulties in getting source data can be overcome. The second request was deferred for consideration until September.

A plant-wide SS material survey for all Engineering groups has been scheduled to start in October. This will be for all SS material in reference to procedures.

Schedules for recovery of 321 Building wastes, also KAPL wastes and UNH spill. First two items are about one to one and one half years off depending on T Plant operating schedules. Recovery of the UNH spill is subject to a cost review to determine feasibility.

FINANCIAL DEPARTMENT PERSONNEL AND ORGANIZATION

AUGUST, 1955

	<u>Current Month</u>	<u>Prior Month</u>
<u>Personnel Changes During Month</u>		
Employees at beginning of month	488	482
Additions and transfers in	26	23
Removals and transfers out	16	(17)
Employees at end of month	<u>498</u>	<u>488</u>
<u>Personnel by Components at Month-End</u>		
<u>General</u>	<u>10</u>	<u>10</u>
<u>Auditing Section</u>	<u>16</u>	<u>16</u>
<u>Budgets and Measurements Section</u>	<u>12</u>	<u>11</u>
<u>Contract Cost Section</u>		
General and Consolidations Cost Unit	12	12
Engineering Cost Unit		
General	4	5
Design Cost	7	7
Project Cost	20	18
Technology Cost	11	11
Employee and Public Relations Cost Unit		
General	2	2
Plant Activities Cost	10	10
Community Cost	5	5
Medical Cost	3	3
Manufacturing Cost Unit		
General	2	2
Financial Representatives	11	12
Budgets and Control	17	18
Reports and Records	16	16
Product Costs	<u>4</u>	<u>4</u>
	<u>124</u>	<u>125</u>
<u>General Accounting Section</u>		
Accounts Payable Unit	23	21
Accounts Receivable Unit	21	21
General Books Unit	17	17
Administrative Planning	3	3
Contract Reimbursements	<u>6</u>	<u>5</u>
	<u>70</u>	<u>67</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	16
Monthly Payroll Unit	12	11
Benefit Plans Accounting Unit	12	13
Payroll Reports Unit	7	7
Weekly Payroll Records Unit	8	8
	<u>63</u>	<u>62</u>
<u>Procedures and Computing Section</u>		
Computing Operations Unit	27	21
Numerical Analysis Unit	10	10
Procedural Analysis Unit	16	22
Scheduling Unit	20	20
Records Operations Unit	8	8
	<u>81</u>	<u>81</u>
<u>Property Accounting Section</u>		
Appropriations Unit	5	5
Inventory Accounting Unit	11	11
Plant Accounting Unit	48	43
Property Management	4	4
	<u>68</u>	<u>63</u>
<u>SS Accountability Section</u>		
Reactor Area - SS Accountability Unit	5	5
Separations Area - SS Accountability Unit	16	15
Metal Preparation Area - SS Accountability Unit	8	8
SS Accounting Unit	6	6
SS Measurements Unit	11	10
	<u>46</u>	<u>44</u>
<u>Rotational Trainees</u>	<u>8</u>	<u>9</u>
	<u>498</u>	<u>488</u>

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HW-38828-W

PROCEDURES AND COMPUTING SECTION
MONTHLY REPORT - AUGUST 1955

GENERAL

The first major program, weekly payroll, was cut over to the 702 this week for the pay period ending August 21, 1955. Conversion had been delayed because of air conditioning trouble and later machine trouble. The latter problem was the appearance of stray bits in memory. When located, the source of difficulty was not memory itself, but a poor ground connection in the console, which caused a feed-back into the power supply.

The payroll as well as all payroll reports were run on the 702 for this August 21 pay period. Parallel operations for the periods August 7 and August 14 had been run to test the system, prior to the actual conversion. Other applications will be converted to the 702 as soon as possible and should be made with greater ease, because of the experience gained on the payroll conversion.

The need for a high-speed sorting routine for the 702 EDPM has become evident. In a recent problem in which corrosion losses of all Hanford process tubes were computed, approximately 3/4 of the total running time was spent in sorting the computed results for output, using the standard sorting routine furnished by IBM. Another problem, a three-dimensional pile control problem, requires the generation and sorting of some 50,000 quantities. Use of IBM's sorting routines would make this problem economically infeasible. To overcome this basic difficulty, the development of an improved sorting routine has been undertaken. Features of this routine include the use of six tape units, instead of the present four, to increase running speed, and the ability of the programmer to specify record groupings on tape, both before and after the sort. Programming of the routine has been completed and debugging is presently being carried out. The routine will be written and ready for use by the second week in September.

The contract for the Addition to the Records Center was awarded to Lewis Hopkins Company on August 11, and preliminary work has begun.

The revised File Manual was issued on August 15, 1955.

PROCEDURAL ANALYSIS

Forms control reviewed 389 orders during August covering 1,051,645 forms; 23 orders, amounting to 126,575 forms, were rejected; 103 new forms were designed.

Work is progressing on conversion of Plant Accounting property records on machine tools to paper tape. The new custodian's record, which has been designed for production from converted Plant Accounting records, will meet the dual requirements of Plant Accounting and Property Management. The new form consists of four parts, incorporating a number of innovations and advantages which will serve to facilitate and improve record maintenance. All of the plant records in the machine tool category have been transcribed on to the new history record form. Tape to card processing is progressing together with

PROCEDURAL ANALYSIS (continued)

the development and revising of procedure manuals covering instruction and operation of the model 884 typewriter tape punch and the model 046 tape to card machine.

Conversion to EDPM of APV's and Store Order punched card procedures, as well as Radiological Measurement Evaluation continued during August.

The Motor Vehicle Reports were converted to EDPM and testing on the 702 is nearing completion for cutting over to EDPM processing.

The systems and logic work for conversion of present EAM processing of Classified Files daily activity was completed during August. Detailed programming, debugging and testing remain to be done.

A lecture series, sponsored by Procedural Analysis Unit, covering Industrial Engineering "Common Language Tools" was given to 171 HAP0 employees during August by W. F. Engesser, Professor of Industrial Engineering, Oregon State College. A 50-page outline of techniques studied in the course was distributed to all participants. Examples of each working tool are supported by specific reference material. Objective "Follow-Up" procedures have already been initiated by the Plant Engineering Section Group (97 people) and Procedural Analysis Unit (11 people). Follow-up techniques for others in Financial Department (48 people) and Classified Files (15 people) have not yet been determined.

As a result of micromotion study made of keypunch operations in Computing Scheduling Unit, a comparison chart has been developed for use by the keypunch supervisors in developing time standards. A significant and useful by-product of this study was the disclosure of improper functioning of keypunch machines on programmer skips. Time lost because of malfunctioning of equipment normally would not be noticeable without employing the micromotion film technique, but is of enough significance to pick up several minutes by IBM Customer Engineers.

RECORDS OPERATIONS

Quantity of Records received, processed and stored:

Employee and Public Relations Department	30	Standard	Storage	Cartons
Engineering Department	74	"	"	"
Financial Department	136	"	"	"
Manufacturing Department	125	"	"	"
Radiological Sciences Department	96	"	"	"
	<u>461</u>			

Records Retention and Disposal Schedule Number 217, "Power Operations Records", consisting of twenty-eight individual records was developed and submitted for internal approval.

Microfilming of vital records was started August 8, 1955 by Recordak Corporation under Special Agreement G-64. Forty-five reels of microfilm consisting of 200,139 images have been completed by Recordak Corporation during August.

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PROCEDURES & COMPUTING SECTION

HW-38828-W

NUMERICAL ANALYSIS

A total of 61 temperature maps from KE Reactor have been received and processed in connection with the KE experiment. A request has been received to compute tube flows, powers, and factors for KW Reactor. This will be done for the present using the KE experiment procedure, and eventually become part of an integrated reactor data processing procedure. Other reactor calculations performed during the month included the calculation of tube factors for four temperature maps from H-Reactor.

Work is continuing on the conversion of meteorology data processing to the 702. A representative of the meteorology group is working with a numerical analyst in formulating the problem and programming it for the 702. One phase of the program has been completed.

The conversion of Aquatic Biology calculations to the 702 has been completed, and data accumulated since the first of the year was run. Approximately 3 minutes 702 time are required to process one month's data.

The first 702 run on the production-scheduling problem being sponsored by the Operations Research Study has been made. A system of linear inequalities of order 102×211 was run, and the optional solution obtained in 7 1/2 hours. The equivalent computation had been made previously on the 701 computer at RAND Corporation, and required 6.5 hours to reach optional solution. Further refinements in the form of error checks have been added to the program. A 115×213 system has been assembled and the first 151 iterations run; again the time appears comparable to that achieved on the 701.

The problem of estimating certain lattice cell parameters from buckling measurements in an exponential pile has been set up on the 702. The problem has been investigated from the statistical viewpoint by the Statistics Unit, and a computational procedure devised. The procedure consists of selecting 15 different sets of parameter estimates and computing for each set a theoretical value of the buckling. This value is then combined with the corresponding measured value to yield a residual. The residual is then minimized with respect to each of the parameters, and the best set of parameters determined. A number of cases, corresponding to different slug sizes, cell spacing and cell wetness, have been run. The calculation of the best set of parameters, involving the solution of a 15×15 and a 4×4 system of equations, requires about 20 minutes on the 702.

The calculation of saturated foil activities, used to determine the effectiveness of pile shielding, was carried out on the 702. Approximately 15 minutes were required for the calculation and simultaneous report preparation. The equivalent amount of work formerly required about 8 1/2 hours on the CPC, plus additional machine time for reproducing and listing.

The calculation of the average η of a Hanford cell was carried out on the 702. The problem was the same as that run earlier on the CPC, except that different lattice spacing and slug sizes were considered. In addition, the problem was set up with several free parameters, such as reactor size and exposure, so that the code will be as generally useful as possible. Six exposure levels were studied in the present run, which required approximately 2 hours 702 time.

NUMERICAL ANALYSIS (continued)

Work has been resumed on the solution of the non-linear isotope buildup problem. The problem consists basically of solving a set of non-linear ordinary differential equations for the isotopic concentration of certain heavy isotopes as a function of exposure. The scope of the problem has been expanded considerably over that originally run on the CPC. In particular, the system of differential equations has been expanded from order 6 to order 9, and the temperature dependence of many quantities appearing in the equations has been taken into account. The Runge-Kutta method of solution appeared to work satisfactorily on the CPC, and will be used to run the problem on the 702. Programming is being carried out jointly by a numerical analyst and the problem sponsors, and is well underway.

The calculation of the transient temperature distribution in a slug was undertaken. The problem consists of finding the temperature variation along the radius of the slug as a function of time, given an initial temperature distribution and an arbitrary heat source, which is also a function of time. The temperatures are to be calculated by a step-by-step integration method. Some 40,000 time steps at each of 18 points on the slug radius are to be taken. Programming for the 702 has been completed, and the problem is ready to run.

The results of recent calculations on the tube corrosion of 12,000 Hanford tubes have been corrected to account for tube replacement during the period of the study, and for individual reactor operating characteristics. The corrected results have been punched in cards from magnetic tape so that they may be used by the Production and Planning Scheduling Unit as a base for starting a tube replacement program. The corrections for F-Reactor were completed in time to serve as a guide in replacing tubes in this reactor during a recent outage.

An attempt is being made to determine the effect of backmixing, or molecular diffusion, on the concentration of material in a two-phase separation column. This problem may be stated in the form of two simultaneous ordinary differential equations, the solutions of which are the steady-state concentrations of the material being separated in the aqueous and organic phases. Analytical expressions for the solutions were obtained, and successfully shown to reduce to the ordinary case of no backmixing when the appropriate value of the backmixing parameter is substituted. These expressions are to be evaluated at various points in the column, for different combinations of parameters, including the number of theoretical stages needed for a given degree of separation. In this manner it is hoped to resolve discrepancies noted between the actual and theoretical behavior of the column.

The development of mathematical subroutines and programs for the 702 is continuing. Programs for computing chi-squared tables, differencing floating-decimal tables, and solving systems of linear equations are now available. The latter program has already been used successfully in several applications. Programming and debugging are in various stages of completion on the following projects: Numerical integration, least square curve fitting, calculation of statistical quantities, tabulation of coefficients in rational approximations to fractional powers, and the inversion of matrices. Finally, a general purpose sorting routine has been completed and tested. A last-minute change in the program made it possible to reduce sorting time by a factor of 50%. Using this program, some 3300 80-character records were sorted in about 18 minutes, which compares very favorably with sorting times achieved on other large scale computers.

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PROCEDURES & COMPUTING SECTION

HW-38828-W

COMPUTING OPERATIONS

During the month of August the following non-routine assignments were completed for customers:

Employee and Public Relations	6
Engineering	10
Financial	23
Manufacturing	3
Operations Research	3
Radiological Sciences	2
	<u>47</u>

Service charges for the month amounted to \$50 540.64. Services, by customer, were as follows:

Atomic Energy Commission	\$ 168.64	00*
Employee & Public Relations	1 121.90	01
Engineering	11 967.91	12
Financial	25 500.02	75
Manufacturing	1 715.17	02
Operations Research	8 713.95	09
Radiological Sciences	1 353.05	01
	<u>\$50 540.64</u>	<u>100</u>

* Less than 1%

OPERATIONS RESEARCH STUDY

MONTHLY REPORT

AUGUST 1955

The following is the month end summary of personnel:

	<u>As of 7-31-55</u>			<u>As of 8-31-55</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
Operations Research Analysts	5	0	5	5	0	5	0	0	0
TOTAL	6	1	7	6	1	7	0	0	0

Mr. Carl A. Bennett attended the Gordon Research Conference on Statistics in Chemistry and Chemical Engineering held at Meriden, New Hampshire, August 8 through 12 at which he gave an invited address.

Mr. P. M. Thompson visited the RAND Corporation of Santa Monica, California on August 11 and 12 to discuss linear programming computation. August 15, 16, and 17 was spent in Los Angeles attending the meeting of the Operations Research Society of America at which Mr. Thompson presented a paper on "Editing Problems on Large Linear Programming Matrices".

Mr. Robert Y. Dean attended the Operations Research Society of America meeting in Los Angeles on August 15 and 16.

Mr. B. F. Butler attended the joint symposium sponsored by Stanford Research Institute and the National Industrial Conference Board on "Electronics and Automatic Production", in San Francisco on August 22 and 23.

Mr. Robert Y. Dean attended the meeting of the Econometric Society held in conjunction with the American Mathematical Society, the Mathematical Association of America, the Institute of Mathematical Statistics and the Society for Industry and Applied Mathematics held at Ann Arbor, Michigan on August 29 through September 2.

Production Planning

The initial study of uranium hold-up in reactors and separations plants was completed. The Production Planning Operations Research Mathematical Model was used on the RAND Corporation 701 Electronic Data Processing Machine to simulate Hanford operations. The model was used first to produce a plan to maximize value of plant output. This value was then incorporated in the model as a restraint. The value term was allowed to decrease while obtaining successive solutions minimizing uranium metal hold-up. During the early iterations significant reductions in hold-up were made with little loss in value. As the study continued the ratio of reduction in value to reduction in uranium hold-up increased.

This study of the relationship of uranium hold-up versus value had interesting operational implications. The present policy requires that the inventory of irradiated but unprocessed uranium be kept at the minimum required for adequate cooling. The study demonstrated that this policy is not optimum for achieving either maximum production with minimum cost or for the minimization of uranium inventories integrated over time. A very high penalty for plutonium inventory would be required to justify the policy. Further studies will be made in cooperation with the Manufacturing Department when new operating assumptions are available during the coming month. It is planned also to study the relationship of minimum plutonium hold-up versus value.

These new studies will be made on the Hanford 702 Electronic Data Processing Machine. This was made possible by the successful development of a linear programming code for this computer. In testing the code, the computing time was identical with that required for the same problem on the 701 computer at the RAND Corporation. Since the 702 is a business machine with less speed in arithmetic operations than the scientific 701 computer, this was a remarkable accomplishment. This achievement was obtained by taking full advantage of the logic and programming features of the 702 in every way possible. It is an encouraging omen for the Hanford decision (which was a unique one) to use the 702 machine for both commercial and scientific data processing.

Data Processing

Work on the Data Processing Operations Research is continuing with gratifying interim results. Contributions from various Hanford organizational components are reflecting constructive thought relative to operating measurements and control. In almost all instances the need for improved personnel information has been emphasized.

Planning and Scheduling of Capital Improvements

An Operations Research Program has been initiated to investigate the problem of maintaining desired production levels during proposed alterations and improvements to production facilities. Effective budgeting and appropriate scheduling of research and development programs are an integral part of the proposed planning.

END

**DATE
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8 / 5 / 92