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MONTHLY REPORT
HANFORD ATOMIC PRODUCTS OPERATION
FOR
JULY 1956

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Dr. Lewis Sobel
Dr. F. A. O. (M) 6/15/92
 PM Eick 6-15-92

Compiled by
DEPARTMENT MANAGERS

August 23, 1956

RICHLAND, WASHINGTON

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

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MONTHLY REPORT
HANFORD ATOMIC PRODUCTS OPERATION

JULY 1956

GENERAL SUMMARY

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PRODUCTION OPERATIONS

The net production of acceptable finished slugs was 434 tons which was 100% of the forecast.

The reactor input production was 10% higher than forecast principally because the actual time operated efficiency of 75.1% exceeded that assumed in the forecast by 4 percent.

The reactor output was 115% of the forecast because of the early discharges of cored material to alleviate the potential stuck charge problem.

A total of 8 slug failures occurred during the month with 165 hours of outage time charged to rupture removal.

Tube replacement programs were conducted at D, F and H. A total of 213 tubes were removed and replaced, and 24 empty channels were retubed. A total of 361.2 hours were expended during the month for the replacement work.

The Redox plant remained down for the cleanup of the 233-S building until July 24. For the remainder of the month the facility operated at rates of 8 to 10 tons per day.

The Purex plant, using low exposure material as feed, operated continuously at a 12-ton per day rate until July 5 when a shutdown was required to prepare the facility for the processing of high concentration material. Dissolving was resumed on July 10 with stable operation achieved on July 17 and continuing until July 24, when a shutdown was necessary because of a plug in the plutonium concentration equipment. A flushing program was in progress at month end.

ENGINEERING TECHNOLOGY

Considerable emphasis will be placed on the technology of organic coolants. Progress to date consists of designing and fabricating an in-pile test section, and designing and procuring components for the associated test loop, which will permit irradiation of the organic materials to determine radiation damage effects. A separate out-of-pile loop is being constructed to obtain information on coking effects as a function of heat flux, velocity, and coolant composition.

Sufficient good quality I & E slugs containing cores of 1.44 percent U-235 are now available for pile charging to pilot performance at high specific powers.

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Studies with the profile pulse column indicate that the entrainment of solids grossly distorts the theoretical distribution of zirconium-niobium in Purex extraction columns, and limits the decontamination factor obtainable under some operating conditions.

The prototype UO_3 calciner was completed and shakedown runs are in progress. Desirable modifications of the shaft seal were developed and recommended for the plant units.

A report was issued during the month containing a preliminary discussion of the results of studies of improved production reactor technology. Among the conclusions presented in this report are (1) that the graphite moderated, water cooled reactor concept best meets the functional and schedule objectives of the improved production reactor program, and (2) that development emphasis should be placed on the attainment of coolant temperature conditions suitable for efficient power recovery. Other reactor design development activity during July included studies of modifications necessary to sustain higher process water flow rates in the 100-K Area, studies of the use of organic reactor coolants, studies of the modification of an existing reactor for electric power recovery, and evaluation of prototype temperature monitoring and flow monitoring system components.

Work continued during the month on the preparation of a limited scope package for a new plutonium producing reactor embodying a recirculation cooling system. Design criteria for the thermal shield, biological shield, ball safety system, and pile gas system were approved.

Construction progress was generally impeded by shortage of craftsmen and unbalanced craft crews. Priorities for use of labor were continued on major projects to the degree that craftsmen were available. The primary concern on Minor Construction work was the critical shortage of welders. This shortage was partially counteracted by the execution of a fixed-price contract for shop fabrication of front face piping to be used in 100-D, DR, F, and H Areas. The present welder strength is being increased by additional qualifications according to HAP0 standards, and the total work force is being enlarged correspondingly.

A rough draft of a report on the preliminary studies of reactors for the Plutonium Fuel Cycle Demonstration Reactor has been prepared and circulated for comment in preparation for the visit here on August 8 and 9 of the delegation from the Washington AEC. Of the four reactor concepts considered, the graphite moderated and the heavy water moderated types are considered to be preferable to the light water moderated and graphite fringe-driven types from the standpoint of plutonium cycle demonstration, experimental flexibility, auxiliary testing, and power reactor applicability.

GENERAL

Three cases of plutonium deposition arising from a single incident of the previous month were carefully followed; one is expected to show a deposition of perhaps 5 to 10 times the permissible limit.

The old case of plutonium deposition referred to last month changed prognosis by the localization and effective removal of plutonium still residing at the site of a puncture wound.

Success was achieved in measuring the vertical concentration gradient in stack gas plumes. This will accelerate the solution of effluent dispersal problems.

AEC-GE agreements necessary because of prime contract provisions were signed with respect to: (1) Work or services to be performed by HAPO which is related to other programs of the Commission or of other Government agencies in accordance with Article II, paragraph 8(d) (often referred to as "related services" under the Basic Contract); (2) the system of product inspection to be maintained (Article VI, Section 5); and (3) the research and development program for the fiscal year 1957 (Article VI, Section 7).

The conversion of a reactor power and exposure studies calculation, being used in a special operations research study, to the IBM 702 was accomplished in July. Data for the period from September 1955 through April 1956 was processed to accumulate tube-by-tube exposure figures for all reactors and to report the exposure of discharged tubes. Approximately an hour of machine time was required to process a month's data for all reactors.

The preparation of the monthly payroll on the electronic data processing machine began on a regular basis in July, a trial run having been made in June.

July was a very active month in the conduct of community relations. A physician's day was conducted to acquaint area physicians and hospital administrators with General Electric, Hanford and the health and insurance programs. Indications are the venture was successful.

The cost-of-living increase which resulted from the rise in the Bureau of Labor Statistics' Index for June 1956 over the September 1955 Index became effective July 30.

New graduates reporting during the summer have resulted in a present total of 100 on the Personnel Development Program's rotational-work-assignment activity. These people should prove an excellent source of manpower for filling anticipated openings within the next several months. An introductory program designed to acquaint these people with the Hanford organization was effectively conducted during the early part of this month.

Richland received a traffic safety award this month from the International Association of Chiefs of Police. The award is a "Certificate of Achievement in Police Traffic Supervision in 1955." The award was made for cities competing in the 10,000 to 25,000 population group throughout the nation.

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STAFF

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

AREA PERSONNEL DISTRIBUTION

	100-B	100-D	100-F	100-H	100-K	200-E	200-W	300	700-1100	Other	Total
	Area	Area	Area	Area	Area	Area	Area	Area	Area and Plant General	Areas*	
<u>ENGINEERING DEPARTMENT</u>											
Exempt	6	54	-	2	24	45	62	277	317	40	827
Other	16	29	3	11	21	18	35	234	195	53	615
Total	22	83	3	13	45	63	97	511	512	93	1 442
<u>MANUFACTURING DEPARTMENT</u>											
Exempt	81	61	91	87	66	90	233	115	121	-	945
Other	299	337	266	427	263	433	1 055	566	677	-	4 323
Total	380	398	357	514	329	523	1 288	681	798	-	5 268
<u>FINANCIAL DEPARTMENT</u>											
Exempt	-	-	-	2	-	-	5	6	123	1	137
Other	-	-	-	7	-	-	21	12	335	-	375
Total	-	-	-	9	-	-	26	18	458	1	512
<u>EMPLOYEE AND PUBLIC RELATIONS DEPARTMENT</u>											
Exempt	26	6	6	7	5	8	14	12	209	-	293
Other	71	54	50	44	56	42	130	144	849	54	1 494
Total	97	60	56	51	61	50	144	156	1 058	54	1 787
<u>RADIOLOGICAL SCIENCES DEPARTMENT</u>											
Exempt	1	1	31	-	-	2	20	81	5	-	141
Other	-	5	45	-	3	15	27	174	27	-	296
Total	1	6	76	-	3	17	47	255	32	-	437
<u>GENERAL</u>											
Exempt	-	-	-	-	-	-	-	-	8	-	8
Other	-	-	-	-	-	-	-	-	3	-	3
Total	-	-	-	-	-	-	-	-	11	-	11
Total Exempt	114	122	128	98	95	145	334	491	783	41	2 351
Total Other	386	425	364	489	343	508	1 268	1 130	2 086	107	7 106
GRAND TOTAL	500	547	492	587	438	653	1 602	1 621	2 869	148	9 457

* Includes White Bluffs and B-Y Exchange

HANFORD ATOMIC PRODUCTS OPERATION
NUMBER OF EMPLOYEES
JULY 31, 1956

<u>DEPARTMENT</u>	<u>EXEMPT</u>		<u>OTHER</u>		<u>TOTAL</u>	
	<u>7-31-56</u>	<u>6-30-56</u>	<u>7-31-56</u>	<u>6-30-56</u>	<u>7-31-56</u>	<u>6-30-56</u>
<u>GENERAL MANAGER'S GROUP</u>	8	8	3	3	11	11
<u>EMPLOYEE AND PUBLIC RELATIONS</u>						
General	9	9	7	7	16	16
Salary and Wage Administration	11	11	11	11	22	22
Personnel Practices	20	20	41	40	61	60
Education and Training	6	6	173	113	179	124
Employee Comm. and Pub. Rel.	13	12	41	41	54	53
Union Relations	5	5	1	1	6	6
Auxiliary Oper. and Plant Prot.	116	116	792	704	908	810
Community	65	64	257	234	322	298
Health and Safety	48	48	171	172	219	220
<u>ENGINEERING</u>						
Engineering Administration	31	30	90	89	121	119
Advance Engineering	6	6	1	1	7	7
Design	188	187	113	110	301	297
Project	188	186	139	144	327	330
Pile Technology	251	243	169	179	420	422
Separations Technology	163	163	103	103	266	266
<u>MANUFACTURING</u>						
General	25	25	8	8	33	33
Reactor	391	388	1 586	1 552	1 977	1 940
Separations	295	298	1 414	1 433	1 709	1 731
Metal Preparation	113	113	568	566	681	679
Transportation	44	44	446	449	490	493
Purchasing and Stores	61	61	226	239	297	300
Electrical Utility	16	15	75	75	91	90
<u>FINANCIAL</u>						
General	10	10	14	15	24	25
Budgets and Measurements	8	7	5	5	13	12
Contract Cost	24	24	104	101	128	125
General Accounting	9	9	62	59	71	68
Property Accounting	20	20	51	51	71	71
Auditing	15	15	2	2	17	17
SS Accountability	9	10	36	36	45	46
Personnel Accounting	9	9	56	56	65	65
Procedures and Computing	33	33	45	48	78	81
<u>RADIOLOGICAL SCIENCES</u>						
General	6	5	-	-	6	5
Records and Standards	33	34	184	175	217	209
Biophysics	53	56	64	70	122	126
Biology	29	30	43	43	72	73
Engineering	12	10	1	1	13	11
Administration and Comm.	3	3	4	4	7	7
GRAND TOTAL	<u>2 351</u>	<u>2 333</u>	<u>7 106</u>	<u>7 085</u>	<u>9 457</u>	<u>9 418</u>

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MANUFACTURING DEPARTMENT

JULY, 1956

METAL PREPARATION SECTION

The net production of acceptable finished slugs was 434 tons which was 100% of the forecast.

The composite yield of 77% was the same as for the previous month. Bond test rejects constituted the largest single reject type while other reject categories remained relatively constant.

A one month inventory of acceptable slugs was on hand at month end. The bare slug inventory remained low, varying between a six-day to less than a one-day supply.

A slug failure in autoclave testing, the first since September, 1955, occurred during the month.

REACTOR SECTION

The reactor input production was 10% higher than forecast principally because the actual time operated efficiency of 75.1% exceeded that assumed in the forecast by 4 percent.

The reactor output was 115% of the forecast because of the early discharges of cored material to alleviate the potential stuck charge problem.

The established maximum operating levels were not increased during the month because of the seasonal increase in river water temperature.

A total of 8 slug failures occurred during the month with 165 hours of outage time charged to rupture removal.

Twenty-eight reactor scrams occurred during the month, 15 of which were caused by normal panellit system variables.

A total of 108.7 hours was required at D, F and H to locate leaking tubes. At D, one tube leak and one flange leak were found and corrected. At F, three tube leaks, two flange leaks and one gasket leak were corrected. Water collection rates returned to normal at F for the first time since October, 1955. At H, one tube leak was found and corrected.

Tube replacement programs were conducted at D, F and H. A total of 213 tubes were removed and replaced, and 24 empty channels were retubed. A total of 361.2 hours were expended during the month for the replacement work.

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SEPARATIONS SECTION

The production of plutonium from the Redox and Purex plants was 81% and 57% of the forecast respectively.

The Redox plant remained down for the cleanup of the 233-S building until July 24. For the remainder of the month the facility operated at rates of 8 to 10 tons per day.

The Purex plant, using low exposure material as feed, operated continuously at a 12-ton per day rate until July 5 when a shutdown was required to prepare the facility for the processing of high concentration material. Dissolving was resumed on July 10 with stable operation achieved on July 17 and continuing until July 24, when a shutdown was necessary because of a plug in the plutonium concentration equipment. A flushing program was in progress at month end.

Production at the TBP plant was 100% of the forecast. Operations were steady throughout the month, with no downtime required on the second cycle equipment.

The UO_3 plant achieved 91% of the forecast. Production was limited during the month because of the short feed supply as the result of the outages of the primary plants, the failure of one Luckey pot on July 18 which remained out of service for the remainder of the month, and two 20-hour outages to permit tie-in with the new 224-UA facility. The forecast quantity of powder for offsite shipment was achieved.

The forecast quotas of unfabricated plutonium metal and plutonium nitrate were achieved. An additional quantity of fabricated material was made and delivered to the Commission.

The first shipment of product from the Savannah River Plant was received and the fabrication of this material was started during the month.

GENERALPersonnel

Total on Roll July 1, 1956	5266
Net Increase	2
Total on Roll July 31, 1956	5268

W. K. MacCreedy
MANAGER
MANUFACTURING DEPARTMENT

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MANUFACTURING DEPARTMENT

PATENT SUMMARY
FOR
MONTH OF JULY, 1956

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

INVENTOR

W.R. Beddo

TITLE

Bridge Circuit for
X-Ray Photometer

W.K. MacCreedy

MANAGER
MANUFACTURING DEPARTMENT

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HW-44580

METAL PREPARATION SECTION

July, 1956

I. RESPONSIBILITY

Mr. W. M. Mathis returned to Metal Preparation Section after attending the Advanced Management Course II at Crotonville, New York.

II. ACHIEVEMENTA. Operating Experience1. Statistics

	<u>July</u>	<u>June</u>	<u>Year to Date</u>
Total Acceptable Slugs Canned (Tons)	434	426	2,825
Composite Canning Yield (%)	77	77	76
Efficiency (%) (Canning Throughput)	91	91	89
Forecast Achievement (Current Commitment)	100	101	101
Net Acceptable Solid Slugs (Tons)	414	408	2,686
Slugs Returned from 100 Area (Tons)	2.13	1.8	15.11
Canning Yield (%)	77	77	77
Net Acceptable Cored Slugs (Tons)	20	18	139
Slugs Returned from 100 Area (Tons)	1.85	0	3.53
Canning Yield (%)	79	77	68
Autoclave Failure - Solid (No./M)	0.007	0.0	0.001
Autoclave Failure - Cored (No./M)	0.0	0.0	0.0
Acceptable C-4 Slugs Canned (Pieces)	0	0	414
Acceptable Pb-Cd Slugs Canned (Pieces)	3,591	4,915	30,127
Average Steam Generated (M lbs/hr)	24.8	30.0	
Maximum Steam Generated (M lbs/hr)	33.0	40.0	
Total Steam Generated (M lbs)	18,470	21,589	
Coal Consumed (Tons)	1,220	1,459	
Sanitary Water from 3000 Area (M Gals)	64.8	57.3	
Average Rate (GPM)	1,452	1,326	

2. Activities

The Operations Subsection, Materials Unit assumed operational responsibility for the new trichlorethylene bulk storage and pumping facilities which were installed in the tank farm area and 303-F Building. The first tank truck load of trichlorethylene containing 3600 gallons was unloaded on July 6, 1956 and the first pumping performed on July 23, 1956.

Production of 434 tons of acceptable finished slugs, achieved in 21 working days, was 100 percent of forecast. Of the 434 ton total, twenty tons were cored slugs. Seven canning line shifts per day were operated throughout the month.

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METAL PREPARATION SECTION

2. Activities (Continued)

The true yield for uranium slugs canned during July was 77 percent (77 percent for solid eight-inch slugs and 79 percent for cored slugs.) A 1.4 percent increase in the void reject category (1.3 percent to 2.7 percent) was offset by a 1.5 percent improvement in the bond test category (7.5 percent to 6.0 percent.) Bond test rejects constitute the greatest single reject type. All other reject categories remained relatively constant.

A one-month inventory of acceptable canned slugs in 100 Area - 300 Area storage existed at month end. The bare slug inventory remained low, fluctuating between a six-day to less than a one-day supply.

The first autoclave failure since September, 1955, was experienced on July 16 with the eight-inch solid slug failure probably due to a pin hole at the base of the weld bead.

Because of possible aluminum strikes, increased shipments of ingots, caps, and cans were received during June and July. As a consequence, inventories have increased from a three-month supply to approximately five-month's supply.

3. Special Operations

There were 6,138 dingot slugs outgassed in the salt bath heat treating facilities. There were 1,040 slugs rejected by the transformation tester transformed by heat treatment in the same facilities.

There were 3,591 acceptable lead cadmium slugs produced by "B" process canning at a yield of 86 percent. The year to date yield for lead cadmium slugs is 95 percent. The weld bead bubble test rejected 13.6 percent of the pieces canned this month.

4. Schedule Variance

Acceptable canned slug production was 100 percent of forecast, based on the July commitment of 432 tons (HW-43955).

B. Equipment Experience

1. Operating Continuity

Canning line "time operated" efficiency remained at a high of 91 percent.

2. Inspection, Maintenance, and Replacement

The radiograph units for final inspection were relocated to the north end of the 313 Building to perform this operation after autoclaving.

METAL PREPARATION SECTION2. Inspection, Maintenance, and Replacement (Continued)

Conveyors and allied equipment work is still in progress. The relocation will result in elimination of a production bottleneck and an estimated reduction in manpower of four operators associated with radiograph inspection.

The installation of bulk trichlorethylene storage and pumping facilities was essentially completed. Cost of the equipment and installation totals about \$4,600 and estimated annual savings are \$4,300. Perhaps the most important improvement is the elimination of safety hazards associated with the handling of heavy drums and open containers of trichlorethylene. The savings arise from more economical bulk purchases of trichlorethylene and the elimination of 54 gallon drum handling which formerly was necessary.

The modification to component parts conveyors feeding lines five and six is essentially complete. This has reduced the shear pin breakage by fifty percent; however, it is felt that shear pin breakage is still excessive.

A good deal of trouble has been experienced with electric motor failures in the slug recovery area. These failures have occurred in spite of the fact that these motors are totally enclosed.

One of the radiograph trays has been in service for approximately thirty days and operation appears satisfactory. Two more trays are promised for delivery by August 15th.

The number two cap and can machine was started up on July 16th after modifications.

C. Improvement Experience1. Production TestsP.T. 313-47-MT "Cored Slugs from Extruded Blanks and Rolled Rods"
HW-33189

The processing of eight-inch drilled cored slugs for high goal irradiation was continued. A total of 20 tons of finished slugs was produced with a 79 percent yield.

With the exception of a limited quantity of slugs to be recovered, the present inventory of bare cored slugs with 3/8-inch hole diameters has been processed. Delivery of the first shipment of bare cored slugs with 1/2-inch hole diameters from Fernald is expected early in August.

P.T. 313-56-MT "Canning of Four Tons of Dingot Uranium for Pile Evaluation" HW-37695

The preparation of eight-inch dingot uranium slugs for low goal exposure was continued as authorized by Supplement A of the

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METAL PREPARATION SECTION

1. Production Tests (Continued)

production test. Thirty-two tons of finished slugs were produced with a 70 percent yield. Excess hydrogen in dingot uranium continues to cause a high bond test reject rate. Even though the bare slugs are outgassed in a salt bath before canning, sufficient hydrogen is not removed to obtain yields comparable with finished ingot uranium slugs.

Since a recent test has indicated rod outgassing offers an effective method of reducing hydrogen in as-received dingot slugs to a level equal to ingot uranium, a request is being routed to have all dingot metal shipped to HAPD rod outgassed at Fernald until Mallinckrodt develops a method of controlling hydrogen in their dingot reduction process.

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

A total of 90,000 truline aluminum cans was received for the preparation of truline solid slugs to be evaluated in C pile. Necessary tool changes on an Acme Gridley screw machine to cut truline features on the end caps of canned slugs is essentially complete. It is planned to begin preparing truline slugs early next month.

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

The separation of bare slugs using the metal quality tester was continued, sorting the poorest five percent of the slugs tested for processing and lot charging in the reactors with the upper 95 percent quality level material. Approximately 170,000 of the 255,000 slugs scheduled to be tested have been processed.

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

The final yield on 196 enriched (1.44 percent) I and E slugs canned in June was 40 percent. Although welding and bond test rejects continued to be abnormally high because of braze porosity, some yield improvement (approximately 10 percent) was realized from using a 50 second canning cycle, grooving the caps to create an airtight reservoir around the cap closures, and mechanically vibrating the can-sleeve assemblies to remove entrapped gasses before slug insertion.

Three hundred additional enriched I and E slugs were canned during July. Since testing is incomplete, yield figures will not be available until next month. Preliminary results indicate the final yield will be about the same as reported for the slugs canned in June.

METAL PREPARATION SECTION2. Process Tests and Revisions

The second weld inspection booth was installed on finishing line number three on July 15, 1956. The booth provides diffused lighting which is not as hard on the eyes as the fluorescent lights.

Two prototype vibrating baskets were installed July 16 on canning line number three, and are being used to can production material. The initial operation has resulted in the necessity for slight modifications in the geometry of the device. These changes are being incorporated in the final drawings. An appropriation request has been approved for the fabrication and installation of vibration equipment for the entire canning area. A target date of September 30, 1956 has been set for completion of this work.

The braze line inspection work station layout has been improved by designing an integrated, mobile unit which contains all testing equipment and records arranged for maximum motion economy. To prevent glare, diffused lighting was installed, improving accuracy and reducing operator fatigue. These improvements have decreased the time required for the statistical phase of the job, and have increased the time available for marred surface inspection.

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 Costs1. Labor Variance

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

2. Material Variance

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

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

No appreciable change is anticipated in the unit cost of I. M. E. against the June actual.

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METAL PREPARATION SECTION

E. Plant Expansion

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

The Fly Ash separator has arrived on plant, and with arrival of structural steel on July 23, 1956, construction will commence. The installation will still be completed by September 15, 1956 according to Commission representatives.

Project CA-601 - General Grounds Improvements - 300 Area

The architect engineer, Nickum and Sons, has completed the design. The bid was let July 2 to the L. W. Vail Company. The Commission first informed General Electric that the funds for this contract would come from the Fiscal Year 1956 budget. However, the Commission has since learned that this is impossible and the funds will have to come from the Fiscal Year 1957 budget, which will be available between August 1 and 15. At this time, L. W. Vail will start construction ten days after notification.

Project CG-614 - Hanford 4X Program

All work was completed by plant forces on this Project June 1, 1956. The fixed price contractor for the changehouse will complete his phase of the contract by July 31, 1956, with only exceptions. This will complete the project.

Project CG-640 - Noise Reduction - 300 Area

Minor Construction is performing their phase of the acoustical treatment of the 313 Building with a scheduled completion date of August 3, 1956. Only a few remaining items need correction.

Maintenance has installed a portion of the Noise Stop Baffles over the metal recovery area. The remaining canning area will be complete as soon as the necessary Unistrut material arrives on the plant.

Power and Maintenance completed the portion of the Noise Reduction program for the 384 Building with the acceptance of the air compressor system. Actual measurements of the apparent noise reduction will be next month.

The Industrial Sound Company has advised that they will send approval drawings on the improved lathe enclosures from their plant on July 23, 1956.

Project CG-646 - Modifications to Pickle Machines - 313 Building

The Metal Wash Company has commenced fabrication of the first unit. It is expected to arrive on the plant about August 28, 1956. The beneficial use date of the second unit will be November 23, 1956. The Operations Subsection has estimated that operation requirements can be met with this schedule.

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METAL PREPARATION SECTIONF. Significant Reports Issued1. Routine

<u>Number</u>	<u>Title</u>	<u>Author</u>	<u>Date</u>
HW-44027	Monthly Report, Process Subsection June 1956	K. V. Stave	7-2-56
HW-44028	Monthly Report, New Fuel Element Production Program, June 1956	W. A. Blanton	7-2-56
HW-44250	General Analytical Control Program I	G. B. Hansen	7-10-56
HW-44285	Uranium Quality Control Analytical Results	G. B. Hansen	7-12-56
HW-40819 RD	Six Months Production Forecast and Operating Assumptions	H. E. Berg	7-9-56
HW-44243	Operations Subsection Monthly Report	W. W. Windsheimer	7-3-56
HW-41288	Production Report, Metal Preparation Section, Operations	H. E. Berg	7-6-56
	Monthly Report, Projects and Personnel Development	D. W. Haught	7-6-56
	Monthly Report, Contact Engineering Unit	J. W. Nageley	7-20-56

2. Non-Routine

HW-44029	Progress Report on the Use of Vibration to Eliminate Voids in the AlsI Bonding Layer of Fuel Elements	C. A. Strand	7-2-56
HW-44085	Evaluation of Aluminum Cans Not Washed by the Vendor	T. D. Naylor	7-5-56
HW-44273	Evaluation of Low Silicon Concentration in the Canning Furnaces	D. D. Stone	7-10-56
HW-44274	Canned Uranium Slug Lots Tested for Minimum Can Wall Thickness	R. H. Lincoln	7-9-56
HW-44316	Ingot Numbering System	R. E. Olson	7-13-56

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METAL PREPARATION SECTION

HW-44580

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III. PERSONNEL

A. Organization

C. A. Burgess transferred from the Process Control Unit to the Process Inspection Unit.

B. Force Summary

	<u>Start of Month</u>		<u>End of Month</u>		<u>Net Change</u>	
	<u>Ex.</u>	<u>Non-Ex.</u>	<u>Ex.</u>	<u>Non-Ex.</u>	<u>Ex.</u>	<u>Non-Ex.</u>
Section General	1	1	1	1	0	0
Operations	22	162	22	164	0	/ 2
Power & Maintenance	37	333	37	333	0	0
Process	40	65	40	63	0	- 2
Projects & Personnel	<u>14</u>	<u>5</u>	<u>14</u>	<u>5</u>	<u>0</u>	<u>0</u>
Section Total	114	566	114	566	0	0
	(680)		(680)			

C. Safety Experience

Canning furnace operators are now protected by aluminum heat shields which reflect the heat which is removed by air flow. With proper clothing, operators can now contact the plates without discomfort.

During 99,023 exposure hours, members of the Metal Preparation Section suffered 44 medical treatment injuries for a frequency rate of 4.44. There were no disabling injuries, and no other accidents or incidents.

A practice evacuation notice was received and the evacuation completed within 15 minutes on July 20, 1956.

There were three security violations during the month of July making a total of eight for the year.

D. Radiation Experience

No exposure in excess of 200 mrad/week and only six exposures in excess of 100 mrad/week were reported during the month. This is the lowest number in the history of the Metal Preparation Section.

E. Personnel Activities

1. Visits and Visitors

R. E. Olson visited William Warner, FAO-AEC; J. C. Mead of National Lead Company of Ohio, and met with Mr. W. G. Petty, Dr. J. U. Shepardson, and Dr. Fellows of Mallinckrodt Chemical Works to discuss uranium quality control.

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Richland, Washington
August 8, 1956

MANUFACTURING DEPARTMENT
REACTOR SECTION
MONTHLY REPORT
JULY, 1956

I. RESPONSIBILITY

Responsibility for operation and maintenance of the White Bluffs water and sewage facilities was assumed by Minor Construction Sub-Section effective July 1, 1956, as a part of their landlord responsibility. These functions were previously administered by the 100-H Power Operations Unit.

Otherwise, assigned responsibilities of the Reactor Section remained unchanged during July.

II. ACHIEVEMENT

A. Operating Experience

Reactor time operated efficiency for July was 75.1 per cent, 1.8 per cent lower than June, and 1.4 per cent higher than May. Major items necessitating downtime were, in order of importance, (1) charge-discharge, (2) tube replacement, (3) maintenance, and (4) rupture removal.

Reactor input production (Pu) for July was 110.0 per cent of forecast. Record input production was achieved at KE and KW Reactors where previous records were exceeded by 3.2 and 1.0 per cent, respectively. Forecast was exceeded due primarily to higher than anticipated power levels and time operated efficiencies.

A. Operating Experience (Continued)

Reactor output production for July was 115.1 per cent of forecast due primarily to the early discharge of cored material to alleviate a potential stuck charge problem. The discharge of high and low concentration material was 121.5 and 89.3 per cent of forecast, respectively.

Established maximum reactor operating levels were not increased during July. Tube power limits at KW Reactor were relaxed an additional 100 kw/tube. However, a power level increase was not achieved due to the counteracting effect of PT-105-630-A, "Pile Power Distribution Control at K Piles," which required operating with an unflattened heat distribution.

A total of 8 slug failures occurred in July as compared with 11 in June and 12 in May. Total reactor outage time in July caused by ruptures was 246.6 hours, of which 164.9 hours were required for rupture removal and the remaining hours were utilized for charge-discharge and miscellaneous maintenance.

Reactors sustaining ruptures were as follows:

	<u>C</u>	<u>D</u>	<u>H</u>	<u>KE</u>	<u>KW</u>	<u>Totals</u>
Eight-Inch Regular	2	1	1	1	1	6
Eight-Inch Cored	0	1	0	0	0	1
"C" Metal	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>
Totals	3	2	1	1	1	8

1. Statistics

Operating statistics are summarized in the table on Page 3.

2. Activities

Tube replacement programs were conducted at D, F, and H Reactors with 213 tubes removed and replaced and 24 empty channels retubed. Reactor outage time required for these programs was 305.9 hours. In addition, 55.3 hours were used during July at H Reactor on a tube replacement outage extending into August; thus, a total of 361.2 hours were expended for July tube replacement work. At D Reactor, 57 tubes were removed and replaced and four empty channels were retubed in 79.8 hours. At F Reactor, 100 tubes were removed and replaced and two empty channels were retubed in 119.3 hours. At H Reactor, 55 tubes were removed and replaced and 19 empty channels were replaced in 106.8 hours. During a second outage at H Reactor, which extended into August, 103 tubes were removed and 79 tubes were inserted ready for Van Stoning in 55.3 hours by month end.

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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>	<u>Total Or Ave.</u>
Reactor Time Operated Efficiency (%)	95.3	77.0	51.9	88.8	52.4	61.3	83.3	90.5	75.1
Reactor Outage Time (Hrs)	33.3	134.9	353.9	62.2	347.8	284.7	121.8	70.8	1409.4
Plutonium Production Special Irradiations and Tests	1.3	36.0	4.0	21.5	6.3	3.5	2.3	-	74.9
Total Outage Time	34.6	170.9	357.9	83.7	354.1	288.2	124.1	70.8	1484.3
Reactor Unscheduled Outage Time (Hrs)	0.6	71.1	169.7	24.4	6.5	47.8	124.1	70.8	515.0
Metal Discharged (Tons)	29.2	92.1	48.3	17.8	41.2	40.6	73.2	34.4	377
Water Quality (ppm Turbidity)									
Raw Water - Average	10	10	9	11	11	9	10	10	
Raw Water - Maximum	15	16	14	18	18	14	15	16	
Process Water - Average	0.006	0.006	0.004	0.004	0.004	0.003	0.004	0.004	
Process Water - Maximum	0.007	0.008	0.005	0.006	0.008	0.005	0.007	0.007	
Water Pumped (MM Gals)	1986	3214	1571	2112	1433	1839	5589	6058	23802
Bldg. 190 to Reactor			621						621
Bldg. 182 to 200 Areas					1688	2169	5910	6281	27376
Bldg. 181	6017		5311						
Steam Generated (MM Lbs)	165		204		96	82	26	21	594
Coal Consumed	10559		12920		6715	5477	277	206	35671
Oil Consumed (M Gals)									483

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

<u>Reactor</u>	<u>Number Removed</u>	<u>Number Replaced</u>	<u>Exposure/Tube mrads</u>	<u>Hours/Tube</u>
D	57	61	133	1.16
F	100	102	114.5	1.03
H*	55	74	151	1.38

* Does not include the outage under way at month end.

A comparison of the above figures with figures of the past two months shows a steady decrease in time and exposure per tube. This trend results from pulling broaches and tubes through the piles without vacuuming, and also from wetting down tools, equipment, and front and rear faces to control contamination spread.

Stuck cored material created major discharge problems at the D and F Reactors. A total of 19 stuck charges at D Reactor and nine at F Reactor were discharged. As a result, 30 tons of this material at D Reactor and 25 tons at F Reactor were discharged at a modified goal exposure to alleviate the problem. Remaining cored material will be discharged as concentrations permit.

On July 17, at H Reactor, a charge of metal was flushed onto the discharge elevator when a rear face tube cap came loose as the water pressure was being raised for start-up. The slugs were removed from the elevator during reactor operation by working through the "D" machinery room step plug holes and through access holes drilled in the discharge area rear wall. Approximately 19 hours of outage time were used in preparing for slug removal.

At D Reactor, a section of process tubing containing three metal pieces lodged on the zero-near pad in the discharge area during rupture removal work. The tubing and metal were raked into the basin by working through an access hole drilled in the discharge area rear wall. Approximately ten hours of outage time were required for this work.

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

	<u>Tubes Charged</u>	<u>Tubes Discharged</u>	<u>Casks Shipped</u>
Production Tests	31	38	1
Mint Flattening	18	13	0
"C" Metal	2	9	0
"B" Metal	0	1	0
10-66 Material	0	0	17
Totals	51	61	18

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Ec-4

B. Equipment Experience

A total of 28 reactor scrams occurred in July, of which 15 were caused by normal Panellit system variables and 10 were caused by spurious Beckman trips. Causes of the other three scrams were as follows:

<u>Reactor</u>	<u>Reason</u>
KW	Panellit scram during transfer of power supply from BPA emergency supply to normal instrument supply.
KW	Manual scram due to loss of pressure for high pressure water cross-tie system.
B	B-C inter-tie circuit scram. Cause unknown.

Process tube leak testing programs were conducted at D, F, and H Reactors. A total of 108.7 hours of outage time was required for finding and correcting leaks. At D Reactor, one tube leak and one Van Stone leak were found and corrected on two separate outages. At F Reactor, three tube leaks, two Van Stone leaks, and one gasket leak were found and corrected on two separate outages. Water collection rates returned to normal at F Reactor for the first time since October 1, 1955. At H Reactor, one tube leak was found and corrected. Water collection rates remained high, however, so leak testing of all tubes is scheduled for August.

At KE Reactor, Vertical Safety Rod No. 22, which was irradiated in May, and has been tied-out since, was removed from the unit; a new rod was installed on July 25.

Continued difficulty was experienced with the K Reactors' Vertical Safety Rod systems. As a result of rods not entering the unit, five hoppers of balls were dropped during two scrams at KE Reactor and one channel of balls was dropped at KW Reactor. At KW Reactor, permission was granted to by-pass the interlock circuit which causes a ball drop if a rod does not enter the reactor within 3.5 seconds.

At KE Reactor, twice during the month, the V-73 cross-tie quick opening valve would not open against a differential pressure. The valve was lubricated and the system was revised to permit testing at differential pressures during reactor operation. Daily tests to date have demonstrated satisfactory operation.

At D Reactor, the discharge elevator failed resulting in 3.5 hours of outage time. Investigation indicated that the pin holding a sprocket to the synchronizing shaft had sheared making the elevator inoperable.

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

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B. Equipment Experience (Continued)

<u>Reactor</u>	<u>High Trips</u>	<u>Low Trips</u>	<u>Mercury Separations</u>	<u>Leaks</u>	<u>Misc.</u>	<u>Total</u>
B	4	1	3	0	0	8
C	0	0	0	0	0	0
D	0	0	0	2	5	7
DR	0	0	1	0	5	6
F	0	0	0	0	8*	8
H	0	0	0	1	0	1
KE	0	0	123	0	0	123
KW	0	10	108	0	1	119
Totals	4	11	235	3	19	272

*Plugged capillary tubes.

An impulse line failure caused the south surge suppressor on the export water system at Building 182-D to cycle. System pressure dropped approximately 10 psi until the suppressor was removed from service. The unit was repaired and returned to service the same day.

The 100-F Area emergency electrical feeder line tripped out on July 10, during a period of high winds. The 440-volt electrical system was disrupted until burned fuses at Building 1717-F were replaced. The system was returned to service and no operating equipment was affected by the outage.

The 2400/480-volt transformer on the No. 1 incoming line at Building 181-H failed on July 20. The 440-volt bus tie to the counterpart transformer on the No. 2 line was closed, and operation was not affected. Replacement of the faulty transformer is being expedited.

A leak was discovered at a bell and spigot joint in the west 36-inch process water line between the Buildings 183-H and 190-H. All process water flow was diverted through the east line, and repairs were completed with no effect on reactor operation.

A new pump casing was installed on the No. 7 primary process pump at Building 190-H. This casing replaced the original casing which had been temporarily repaired after failing in March, 1956.

The No. 1 generator at Building 165-KW failed to respond on two routine attempts to increase the KW load. On each attempt, an overcurrent relay tripped the circuit breaker in the line connecting the generator to the 4160-volt "C" bus. Repairs were completed, and after suitable testing, the unit was returned to service.

Anthrafilt replacement in the Building 183-KW filters was completed, and the Building 183-KE filters received 176 of the 250 tons needed to complete their restoration.

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B. Equipment Experience (Continued)

A new roof was installed at Building 105-D by Minor Construction. The roof initially blew off in December, 1955, and since that time difficulty has been encountered with water on top of the reactor each time rain occurred.

C. Improvement Experience

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

PT-105-9-MR - "Poison Column Displacement During Reactor Operation"

At D Reactor, the poison discharge equipment was effectively used to displace poison following an outage.

PT-105-506-E - "Recirculation Studies"

At H Reactor, charge-discharge of recirculation tube No. 0961-H and its companion tube, No. 0861-H, was successful.

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

At KE Reactor, six tubes continued in operation under this test. Two tubes were operated at a pH of 6.0, two at a pH of 6.5, and two at a pH of 7.0. All six were purged due to unexplained rapid film build-up.

PT-105-630-A - "Pile Power Distribution Control at the K Piles"

This test is still in the trial stage, involving experimenting with different control techniques.

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

This test, involving production of 7.0 pH process water on a half-plant basis, continued through July without difficulty.

PT-105-563-E - "Evaluation of Synthetic Coagulant Aid"

Addition of Separan as a coagulant aid was continued on a half-plant basis with satisfactory results.

A lucite baffle box has been placed in use for detecting reactor gas leaks. The baffle arrangement in the box permits collection of a sufficient volume of gas to give an instrument indication and allows continuous sampling of the suspect atmosphere.

Five revised Process Standards - Reactor were approved and issued. The Standards changed are titled: (1) "Process Water Trip Settings," (2) "Panellit System," (3) "Power Level Monitors, Proportional Counter, and Galvanometers," (4) "Flux Monitors," and (5) "Make-Up of Tube Charges."

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C. Improvement Experience (Continued)

The most significant changes accomplished in the foregoing Standards are, respectively, (1) authorized setting the K cross-tie V-73 valve control on "manual close" under specified conditions during emergency generator tests, (2) deleted provisions for observing tube outlet temperature when the Panellit gage is taken out of service and added provisions for oiling excessively fluctuating Panellit gages, (3) modified sensitivity requirements for the No. 1 galvanometers, (4) made hot start-up trip settings more restrictive and modified K Reactor period trip requirements to permit hot start-ups when the period trip is inoperable, and (5) revised rear dummy charge requirements for permanent poison columns to permit greater flexibility.

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

D. Events Influencing Costs

Irradiation costs for July are expected to be approximately \$40,000 higher than June. The major factors contributing to this increase are (1) an increased demand for process tubes and tube removal tools, (2) a 12 per cent increase in the price of coal and fuel oil, and (3) the increase in total force. Water treatment costs for July remained essentially the same as for June. The seasonal improvement in raw water quality permitted the discontinuance of activated silica addition, but this savings was offset by increased acid costs resulting from the reduction of process water pH at four plants.

Unit cost for July is expected to be slightly higher than June due to the expected increase in total cost while production remained essentially constant.

E. Plant Development and Expansion

1. Project Status

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

CA-512 - 100-K Area

A Work Authority was issued for Revision V to the project. Work continued on the effluent water gamma monitor system, the 107-K tank foundation repairs, and the Buildings 1704 and 1720 heating and ventilation systems. Proposed VSR changes were discussed with Engineering; however, availability of funds is in question. The fireye installation (Stage 1) on the No. 3 boiler, Building 165-KE, was essentially completed. Bids were again requested for the RC-3 valve in the hope that the October 1, delivery date can be improved. Preparations were made to start ATP's at Building 1706-KER on August 1.

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E. Plant Development and Expansion

1. Project Status (Continued)

CG-558 - Reactor Plant Modification for Increased Production

The 900 test switches for the pressure monitor system performed without failure during July. Tests of the Building 190 Annex pumps continued in an effort to reduce cavitation and noise. Project progress continued to be retarded by the shortage of craft personnel. As a result, part of the pipe fabrication work was contracted to "Bay Company." A target shutdown schedule was published by Project Engineering; the 100-B Area outage is scheduled to begin October 8.

CG-583 - Moisture Monitoring System for Detection of Leaking Process Tubes, 100-B, D, DR, F, and H

The defective amplifier in Building 105-D Dynalog was replaced. Apparent corrosion of Building 105-F silver dewcell windings is believed to be caused by unequal application of hygroscopic solution along cell length. Damaged cells will be repaired or replaced. A schedule of remaining installation work and time required to complete this project was resolved at a planning meeting held July 24.

CG-616 - Installation of Acid Feed Equipment - 100-B, C, D, DR, F, and H

A "Notice to Proceed" was issued to the Hoffman Construction Company on July 11. Materials were moved in and excavation began at Building 183-DR on July 23.

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

Purchase requisitions were issued for the fabrication of three special duct assemblies and the installation of control console components. In order to supply all required components to the vendor, the existing CG-609 console in Building 105-C control room must be dismantled and removed. A letter requesting this work is in preparation. A nine-tube mock-up is being assembled for testing and development purposes. Testing of the new tip-off continued.

2. Plant Engineering

A number of engineering and development studies were active in the Reactor Section during July. The studies, in general, are aimed at decreasing costs and/or increasing production. Details are given in Document HW-44577. Several items of interest are reported below.

Installation of glass fiber acoustic material on the walls of Building 182-B has been completed. The noise level at the most disturbing frequency was reduced approximately 50 per cent. Since this reduction does not bring the noise level

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

within HAPO limits, it was recommended that accoustic baffle boxes be installed on the export motors.

A method for controlling the noise produced by Building 105-C Ball 3X trough vibrators has been recommended. Noise during vibration operation causes speech interference problems in the Ball 3X control room and on the front and rear elevators.

The work area cranes at all 105 Buildings were evaluated from a safety standpoint. Recommendations for improved safety were issued.

F. Significant Reports**1. Routine**

Monthly operating reports issued for June were:

HW-43938-A	Reactor Section	R. S. Bell	7/6/56
HW-44048	Operations Sub-Section	A. R. Maguire	7/1/56
HW-44000	Process Sub-Section	O. C. Schroeder	7/2/56
-	Projects & Personnel Development	F.A.R. Stainken	7/2/56
HW-44066	Radiation Monitoring Sub-Section	P. C. Jerman	7/3/56
-	Reactor Areas Maintenance	R. T. Jessen	7/3/56
-	Project & Special Reactor Maintenance	E. E. Weyerts	7/7/56
HW-44095	Power Sub-Section	J. C. McLaughlin	7/5/56

Other routine reports issued during July included:

HW-44567	"Monthly Progress Report - New Plants Expansion - Reactor Section"	D. S. Lewis	7/31/56
HW-44563	"Monthly Progress Report, Reactor Section Expansion, July, 1956"	J. P. Langan	7/31/56
-	"Status of Reactor Section Projects, Informal Requests, and Budget Items"	F.A.R. Stainken	7/20/56
HW-44025	"Reactivity Balance and Associated Data, June, 1956"	A. P. Vinther	7/2/56

2. Non-Routine

HW-43827	"Coolant Flow Rates at the K Reactors"	T. D. Dow	
		P. C. Walkup	6/29/56
HW-43876	"Justification for Extending Scram Recovery Time at C Reactor"	G. F. Owsley	7/13/56
HW-43945	"Increased Reactor Cooling Water Flow"	J. R. Young	6/27/56
HW-43946	"A Study of the Contamination Spread Resulting from Wind Action on Exposed Contaminated Waste"	R. T. Woolsey	6/29/56
HW-43954	"Horizontal Rod Calibration"	D. E. Simpson	6/26/56
HW-43998	"A Method for Routine Xenon Transient Calculations Using Pile Fractions"	G. R. Parkos	6/29/56

F. Significant Reports

2. Non-Routine (Continued)

HW-44055	"Increased Capacity of Metal Storage Buckets"	E. C. Arbuckle	7/10/56
HW-44097	"Reactor Gas Loss Analysis"	T. D. Dow	7/12/56
HW-44098	"Analysis of Tube Deflections"	R. H. Gay	
		R. R. Bloomstrand	7/12/56
-	"Justification for Additional VSR's - K Reactors"	R. E. McGrath	7/6/56

III. PERSONNEL

A. Organization

There were no appointments within the Reactor Section during July.

B. Force Summary

	<u>Beginning Of Month</u>	<u>End Of Month</u>	<u>Net Change</u>
Section General	2	2	0
Operations	422	428	+ 6
Project & Special Reactor Maint.	206	218	+ 12
Reactor Areas Maintenance	570	592	+ 22
Projects and Personnel	54	56	+ 2
Power	497	494	- 3
Process	84	79	- 5
Radiation Monitoring	<u>107</u>	<u>109</u>	+ 2
Section Total	1942	1978	+ 36

Changes during July included 73 transfers into the Section, 31 transfers out of the Section, five new hires, 12 terminations, five reactivations, and four deactivations.

C. Safety Experience

There was one Disabling Injury during the month. On July 27, at approximately 1:30 p.m., some parts bins in the Building 189-F were being moved with the aid of a power wagon through a cable - snatch-block set-up. One of the bins caught on an "I" beam causing a pin in the snatch block to shear releasing the cable. A Maintenance employee standing nearby was hit in the stomach by the whipping cable. On the basis of abdominal pains reported by the employee, an exploratory operation was performed; no internal complications were discovered. The investigation report of this incident has not been issued at month end.

There were no Serious Accidents or Incidents in the Reactor Section during July.

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D. Radiation Experience

Two Radiation Incidents occurred during July. Radiation Incident No. 109-R occurred at D Reactor on July 4, when a Radiation Monitor Journeyman received an exposure in excess of that planned while attempting to locate the source of unusual dose rates and performing associated personnel monitoring in the discharge area during a normal poison push. The radiation fields involved included a series of beams from two to six rads/hour, the source of which was later determined to be a metal charge which had moved to the rear of a process tube. Investigation revealed that the seating charge, with the exception of four expendable dummies, had been inadvertently removed from the rear of the process tube during the preceding shutdown. The exposure received by the man from this incident and from work during the previous six days totaled 355 mrad, exceeding the weekly permissible limit. Details of the investigation are reported in Document HW-44314.

Radiation Incident No. 110-C occurred at D Reactor on July 11, when an Instrument Trainee received a localized exposure in excess of permissible limits while engaged in discharge area thermocouple repair work. During the work, a check of the employee's clothing revealed glove contamination which could not be removed by flushing with water. The employee left the radiation zone, and a further check revealed a radioactive particle affixed to the outside palm surface of the inner glove. This particle had an uncorrected surface dose rate of 2.5 rads/hour, including 15 mrad/hour at two inches. Official dosimetry calculations by Radiological Sciences indicated a localized dose to the employee's palm of between 1.3 and 17 rads. Details of this investigation are reported in Document HW-44363.

Eighteen Lapses of Radiation Control occurred of which 28 per cent involved spread of contamination outside established radiation zones, and 28 per cent involved personnel hand and skin contamination. The remainder involved minor violations of control procedures.

E. Personnel Activities

At month end, 28 employees are receiving on-the-job training for engineering or supervisory assignments in the Section; 25 of these are on assignment under the rotational training program.

L. A. Carter, Radiation Monitoring Sub-Section, returned from a loan assignment to the Naval Radiological Defense Laboratory after participating in Operations Redwing.

P. C. Walkup, Process Sub-Section, visited the Bingham Pump Company at Portland, Oregon, on July 26, to discuss methods of increasing water flow rates at 100-K Area.

In the Projects and Personnel Development Sub-Section, an informational meeting was held for all exempt employees on July 17. Revisions to the exempt salary plan were discussed.

In the Operations Sub-Section, the sixth in a series of eight sets of training questionnaires was completed and the seventh set issued.

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E. Personnel Activities (Continued)

In the Radiation Monitoring Sub-Section, assistance was given to the Operations and both Maintenance Sub-Sections in the presentation of Radiation Hazard Topic No. 49, "Radiation Exposure Estimate - Hand and Shoe Score Cards."

In the Reactor Area Maintenance Sub-Section, a series of 14 meetings was held to train personnel on Project CG-558 electrical equipment.

In the Power Sub-Section, five exempt and 65 non-exempt employees who had not completed the classroom session conducted during the previous three months, received necessary supplemental and review training.

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SEPARATIONS SECTION

July, 1956

I. RESPONSIBILITY

Responsibilities of the Separations Section were unchanged during the month of July, 1956.

II. ACHIEVEMENT

A. Operating Experience

1. Statistics

a. Bismuth Phosphate Operations

	<u>July</u>	<u>Acid</u>	<u>June</u>	<u>Acid</u>
	<u>Normal</u>	<u>Wash</u>	<u>Normal</u>	<u>Wash</u>
Charges completed-Isolation Bldg.	89	0	232	0
Special charges-Isolation Bldg.	14	clean-outs		

b. Redox Operations

	<u>July</u>	<u>June</u>
Tons Uranium delivered to storage	59.8	164.6
Average Production Rate per Operating day, tons	8.5	10.0
Average Daily Operating Rate for the month, tons	1.9	5.5
Average yield, %		
Uranium	99.3	100.8
Plutonium	99.9	99.6
Total Waste Loss, %		
Uranium	0.49	0.44
Plutonium	1.39	1.08
Average cooling time (days)	124	110
Minimum cooling time (days)	107	103
Percent down time	78	48

c. Purex Operations

	<u>July</u>	<u>June</u>
Tons Uranium delivered to storage	112.7	341
Average Production Rate per Operating day, tons	9.09	11.4
Average Daily Operating Rate for the month, tons	3.63	11.4

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	<u>July</u>	<u>June</u>
Average yield, %		
Uranium	93.0	94.0
Plutonium	80.0	91.8
Total Waste Loss, %		
Uranium	1.16	0.61
Plutonium	2.3	1.40
Average cooling time (days)	145	101
Minimum cooling time (days)	133	91
Percent down time	60.0	0

d. 231

	<u>July</u>	<u>June</u>
Batches started	79	232
Batches completed	88	232
Batches awaiting processing	1	8

e. 234-5 Operations

	<u>July</u>	<u>June</u>
Batches completed through Task I	136	172
Batches completed through Task II	139	171
Runs completed through Task III	54	116

Waste Disposal (units)	135.93	184.1
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f. UO₃ Operations

	<u>July</u>	<u>June</u>	<u>To Date</u>
Uranium drummed, Tons	474.27	514.32	15,355.64
Uranium shipped, Tons	518.09	488.84	15,323.63
Average cooling time, days	130	116	
Minimum cooling time, days	113	109	
Waste Loss, %	0.02	0.02	

g. TBP Operations

	<u>July</u>	<u>June</u>	<u>To Date</u>
Tons received from Metal Removal	136.11	175.81	7,331.08
Tons shipped to UO ₃ Plant	136.65	171.76	7,076.63
Average Production Rate per			
Operating day, Tons	4.41	5.84	
Average Daily Operating Rate for			
the Month, Tons	4.41	5.73	

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g. TBP Operations (Continued)

	<u>July</u>	<u>June</u>
Average yield, %	99.13	95.52
Total Waste Loss, %	0.87	1.52
Ratio Actual Waste Volume Returned to Theoretical Volume	1.02	1.00
Percent Down Time	0	1.94

h. Power

	<u>200 East</u>	<u>200 West</u>
Raw water pumped, gpm	6 731	4 951
Filtered water pumped, gpm	758	1 040
Steam generated, lbs/hr	93 407	116 751
Maximum steam generated, lbs/hr	170 000	190 000
Total steam generated, M lbs.	69 495	86 863
Coal consumed, Tons (est.)	3 816	5 146

1. Waste Storage

	<u>Equivalent Tons U</u>	
	<u>July</u>	<u>June</u>
Metal Waste reserve storage capacity-T Plant	83	83
1st Cycle reserve storage capacity-T Plant	361	368
Metal Waste reserve storage capacity-B Plant	51	259
1st Cycle reserve storage capacity-B Plant	74	74
Redox Waste reserve storage capacity	1,148	1,191
Purex Waste reserve storage capacity	2,389	2,491

2. Activities

a. Redox Processing

With the plant shutdown, the major building effort was directed toward cleanup of the 233-S Building. The work proceeded in accordance with a rigid schedule which permitted resumption of operation by July 24. The magnitude of the cleaning effort can be seen from some of the following steps which had to be taken before the present building condition could be achieved. A permanent partition was installed in the control room to shield off the rear of the panel board with its large areas of relatively inaccessible surfaces of piping and copper tubing. Prior to this, a temporary partition was installed and all areas in the changeroom, blower room, lavatory, and front of the control panel were cleaned to non-smearable contamination and painted. Practically the complete ventilation system including duct work, blowers, heating and cooling units, were removed, steam cleaned and replaced. Contaminated instruments on the panel board were

a. Redox Processing (Continued)

removed, cleaned using an ultrasonic cleaning facility and replaced. The can storage room and loadout room were cleaned to normal conditions and painted. The area in back of the panel board containing the highest levels of contamination was wiped several times thoroughly and isolated as noted above. The contamination was fixed with D-1000 to control its spread. These efforts permitted resumption of operations without assault masks in the operating areas of the building.

The plant started up on July 14 at a rate of 8 tons of uranium per day followed by a brief delay caused by replacing the H-5 caustic scrubber pump which failed during initial head-end processing. Rates continued at 8 T/day until July 27, except for a short two hour shutdown on July 26 to replace a steam valve. At this time, rates were raised to 10 T/day where they have remained through month-end.

b. Metal Recovery

1) TBP Processing

Feed supplies were limited due to tank clean-outs and process difficulties at UR farm. Waste pump difficulties at 241-WR limited waste storage requiring column rate reductions for about a week. Operations were steady all month with no downtime on the second cycle equipment.

2) UO₂ Processing

Production was limited because of short feed supplies as the result of scheduled outages at the Purex and Redox Plants. Two shutdowns of 16 hours each were taken to tie-in the new 224-UA Building continuous equipment to the existing process system. Luckey Pot #20 was out of service from July 18 to month-end undergoing repairs for an agitator failure. As a result of the lower production demands, electric pot repairs were stepped-up. Six pots were regasketed, one pot was given a class "A" overhaul, three agitator blades were repaired and one complete agitator shaft was installed.

3) Waste Metal Removal

Tank cleanouts in UR farm continued this month and this slowed UR farm production. Good results were obtained in removal from 101-T and 102-T for the first three weeks after which a move to 107-TX was made. This tank is producing rich slurries at month-end.

In-farm scavenging did not operate this month due to the problems created by Aluminum and Cobalt 60 in stored wastes. TBP wastes were stored due to excessive Co⁶⁰.

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3) Waste Metal Removal (Continued)

One tank of stored in-farm scavenged waste (112C) was released for disposal and pumping of this material to BC-3 crib started on July 31. Waste disposal ditches, under construction will be available in August and waste disposal to ditches is expected to start immediately.

c. T Plant

A total of 49 nitric and 24 caustic-peroxide flushes have now been started. Forty-five of the nitric flushes have completed processing through the 224-T Building with a product pick up of 495% of a standard run. Of this amount 330% was recovered from the 221-T Building and 165% from the 224-T Building. Total product recovery including the initial acid washes is now 702% of a standard run. Product pick up by the peroxide-caustic solutions has been insignificant and all completed flushes have been discarded to waste.

d. B Plant

Decontamination of the failed Redox D-12 concentrator pot was continued by use of the steam cleaning method and by an acid flush. The radiation levels were reduced to 1500 mr per hour on outside of the pot and 9000 mrad/hour over the open pot. The next step will be to flush the inside of the coil and to repeat the pot flush with acid.

e. Z Plant

The 231 Building processed primarily low MWD plutonium which originated from Purex. This material was isolated and loaded to sample cans for shipment offsite as plutonium nitrate. A small amount of plutonium feed solution required special handling because it contained higher than normal amounts of uranium and fission products. It was possible to load about 60% of this special material directly to sample cans for shipment offsite because the uranium was removed effectively and good fission product decontamination was obtained. The remainder was processed through Recuplex for fission product decontamination after first processing in 231 to remove uranium.

Several cans of flush material from Redox were processed late in the month and loaded to filter boats for subsequent handling in the 234-5 Building because this feed was too low in plutonium content to be handled directly in Task I of the RMA Line.

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e. Z Plant (Continued)

f. Purex

Operation of the solvent extraction cycles was continuous at 12 tons per day until July 5, 1956, at which time low g/t metal was depleted and a flush of cell equipment was initiated in preparation for processing high g/t material. Dissolving of slugs averaging 759 MWD/T was started on July 10. Equipment flushing was completed on July 11. Replacement of a failed plutonium concentrator heat exchange tube bundle was completed on July 14 and startup followed immediately. The plant was on the line July 15.

Stable operation of the extraction columns was achieved on July 17. Partial plugging and restriction of normal flow occurred in the final plutonium concentration system on July 22; on July 24 the plant was shut down for cleanout of the L cell equipment and to make repairs.

3. Special Operations

In the Purex Plant, following the startup on July 15 with high g/t feed material, the gamma activity in the final uranium stream was high as the result of displacement of interface crud from the IBX and IBS columns to the final uranium process. As a result all uranium product was recycled for reprocessing until July 20, when the gamma ratio of the uranium product had declined to 35. Recycle was discontinued at this time rather than waiting for a uranium product with a lower gamma ratio in order to increase the plutonium concentration in the process stream.

In the Z Plant Hood 40 was used during the month for the recovery of low MWD scrap metals resulting from the fabrication of Savannah River buttons. The plutonium which was recovered was subsequently processed through the 231 Building before shipment offsite as plutonium nitrate. Hood 41 was used for the recovery of alpha plutonium chips and scraps which were returned from the Product Metallurgy Unit. A small amount of regular RMA Line scrap was also processed. All of this material was used as feed in the RMA Line.

4. Schedule Variance

Redox produced 9.8 tons above the 50 tons committed in July.

TBP produced 101 percent of commitment and the UO₃ Plant produced 91 percent of commitment. Fourteen UO₃ cars were shipped.

In Z Plant no fabrication was actually scheduled for July. The assemblies that were completed will apply towards meeting quarterly commitments. The goal forecast for the preparation of alpha plutonium was completed.

Purex production for the month was 112.7 tons as compared to a commitment of 180 tons.

B. Equipment Experience

1. Operating Continuity

Downtime in Redox amounted to approximately 570 hours for clean up of the 233-S Building following the spill of last month.

The TBP Plant experienced 14 hours of first cycle downtime and 0 hours of second cycle downtime. The first cycle outage resulted when a receiver pump leaked and required replacement. Reduced column rates were necessitated due to outage of 241-WR - 002 pump.

In the Z Plant no unscheduled mechanical difficulties which affected the continuity of operations were experienced.

Downtime this month in the Purex Plant totaled 18½ days. This included 9 days of system flush for high MWD processing, 2 days to replace EL4 tube bundle, and 7½ days for unplugging lines in the plutonium concentration equipment.

2. Inspection, Maintenance and Replacement

a. Cell Equipment Replacement - Redox

The rotometer on the 2-A feed jumper failed to operate properly, and the 2-E letdown valve was found to be leaking through at a prohibitive rate. The jumper and valve were replaced on July 15. When it was definitely determined that the H-4 Sp.G. jumper was leaking in the cell, this malfunctioning unit was replaced with a new jumper. The H-5 recirculation jumper also failed when the sensing legs of the BP Cell became fouled. Normal flushing did not relieve the inoperable condition so on July 19 the recirculation jumper was replaced. A thorough investigation of the PH-5 pump capacity on July 23 revealed that it no longer had sufficient capacity to assure safe service so it was

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a. Cell Equipment Replacement - Redox (Continued)

replaced with a spare which was stored on the canyon deck but had never previously been in service. The new pump is a 3 stage type, and appears to have about twice the capacity of the former pump. During the flush of the E-2 tank to recover the plutonium oxalate it was found that the E-2 recirculation jet EG-24 had plugged, and after normal flushing techniques failed to remove the plug, a new jumper was fabricated and installed.

Two new jumpers and cold side piping were installed to allow direct addition of chemicals to the F-2 and F-4 tanks permitting greater control of the critical pH in these tanks. Recent process changes have made it necessary to make routine anti-foam additions to the F-2 and F-5 boil-up vessels to prevent foaming. After a trial period when temporary addition lines were used a permanent installation was made.

During the recent shutdown the gang valve vent header for the entire building was tied together and vented to the wind tunnel through the D-3 condenser. This installation was made to relieve the condition whereby canyon contamination was spread by the gang valves venting to the individual cells during periods when the cells were open.

The leak in the F-2 pot was reinvestigated this month. The leak was determined to be in the weld on the liquid line from the vessel to the left hand tube bundle at the connection point to the tube bundle. The leak appears to be reasonably well controlled by operating conditions, and a change of the F-2 pot is not contemplated at present.

b. 233-S Building - Redox

The faulty control valve causing the contamination incident last month was replaced with one having adequate drain ports. The instrument lines to this valve were replaced. All vented instrument lines of the type resulting in this incident were tied to a common manifold and vented to the green house. An inspection made of all other control valves in 233-S revealed them to be of the safe "open superstructure" or adequate drain hole type.

A thorough search of all building equipment was made to bring to light similar hazardous layouts. As a result, a decision was made to replace all "closed superstructure" type control valves in the 202-S canyon with safe valves on a replacement basis. To prevent incidents in the meantime, the air lines to these valves were directed past a Beckman chamber to detect radiation backup immediately by sounding an alarm in the dispatcher's office. Those air lines connected to valves passing corrosive solution were replaced with plastic tubing.

c. Cell Equipment - Purex

#4 metal solution centrifuge was replaced with an operational spare. 2AF tank (J5) was replaced with the spare in which the downstream vertical baffle was removed. Alteration in the 2AF tank was made to permit a 2.5 fold increase in the critical mass control specification for this tank prior to processing high g/t plutonium. During the shutdown, testing of the I4 plutonium concentrator revealed a leak in the tube bundle. Replacement of the tube bundle, which delayed startup by two days, was completed on July 14. This 304-L stainless steel bundle was in service 50 days, as compared to 59 days of hot operation for the first bundle.

The B and C cell dissolver off-gas donut jumpers were interchanged when the 10 inch butterfly DOV in the B cell jumper stuck in the closed position. At month end flushing of the plutonium concentration equipment with 20 percent sodium hydroxide was being completed prior to making repairs to the transfer lines in L Cell.

d. Z Plant Maintenance

The incidence of mechanical failures appeared to be lower than normal during the month, however, this favorable experience is probably due to a large extent to the lighter production load. Every advantage was taken of this period to do preventive maintenance, and critical equipment in all phases of the process were overhauled or inspected. Some of the major items which received attention are: The HF equipment for Task II; the crucible sanding and loader in Task III; the vacuum equipment in Task IV; the tripods and the bell jar controls in Task VII; the exhaust dampers serving filter room 309; and the drying towers for instrument air.

A very difficult repair job in Recuplex involved the replacement of the filter blocks in the D6 and D7 tanks of the slag and crucible hood. These blocks which weigh about 100 pounds were cracked and replacement was necessary. This work was accomplished using special procedures and employing plastic bag techniques.

C. Improvement Experience

1. Process Tests and Revisions

a. Iodine Emission

In the Redox Plant insignificant iodine emissions, averaging less than 0.02 curies/day with a 0.04 curies/day maximum, occurred during the period. Metal age has been in the range of 106-139 days. Iodine 131 emissions from the Purex stack during the month averaged 0.214 curies per day.

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b. Waste Scavenging

One short plant-scale test was conducted ending July 1 in which cobaltous sulfate was added to the acid waste in the 13-6 tank to improve scavenging of Co⁶⁰ activity. The sample results indicated no improvement. A second plant-scale test was started July 27 using the cobalt salt. Sufficient chemicals are on hand to treat 750,000 gallons of TBP waste. Process Chemistry studies have shown decontamination factor reductions, with the process employed, of 250-270 as compared to the poor factor range of 5-75 being experienced in the plant process the past eight weeks.

2. Inventions and Discoveries

A report of invention was filed with month for W. R. Beddo, Instrument Technician (now resigned), W-3824 entitled "Bridge Circuit for X-Ray Photometer." This bridge was developed to replace a similar unit developed by the G.E. Company. The new circuit eliminates four adjustable rectifiers which were adversely affected by wear and substitutes one adjustable resistor.

D. Events Influencing Costs

Separations Section expenditures for July are expected to be approximately three percent below the June level. This reduction in expenditures is the reflection of reduced essential material requirements associated with the lower production rate at the Redox and Purex facilities.

E. Plant Development and Expansion**1. Project Status****a. CA-513-A - Purex Facility**

This project is 99.9 percent complete. AEC concurrence for the expenditure of \$125,000 of previously authorized funds to install electrical off-gas heaters on the dissolver off-gas system has been received. Design is in progress.

During the month the monitors on the dissolver off-gas system for detection of radioactive iodine were accepted. The 241-A Tank Farm in-tank circulator circulating system has not been acceptable to date due to faulty operation of air compressors.

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

This project is approximately 51 percent complete. Detailed design of the second remote crane and associated facilities is progressing satisfactorily. Procurement of a spare 1A column is being delayed until complete evaluation of the present 1A column has been made.

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c. CG-598 - Purex Vacuum Acid Fractionator

This project is approximately 65 percent complete. Final pour on the building structure has been completed. Some damage has occurred to parts of the vacuum fractionating equipment in transit; the full evaluation of which has not been determined. The vacuum fractionator unit is presently scheduled for shipment during August, 1956.

d. CG-613 - UO₃ Expansion

Minor Construction continued work on a five day - three shift schedule. Except for instrument work, the 224-U cell work is essentially complete. A cold run test of the prototype agitator and drive resulted in galling of the calciner shaft through a packing gland seizure. Repairs were made and the equipment is being run-in at month-end. Beneficial use date of three calciners has been changed from August 3 to August 17 by Engineering pending altering of seal housings based on the prototype shaft problem. Two to four weeks of acceptance testing will follow.

The powder screw conveyor has been received and is undergoing alterations to seals at White Bluff. Ten railroad cars, altered to handle bulk UO₃ containers, have been received. The balance are due in August. A shielding wall has been completed to shield the maintenance area and bids for the new maintenance shop are expected the last week in August.

e. CG-621 - Redox Contamination Control

E Cell Ozonization: Installation of the air receiver tank for the hytor compressor has been completed. Painting, identification of lines and equipment, and minor mechanical adjustments remain to be completed. Equipment for the E-13 continuous gamma monitor is on order. Mock-up tests of the E-13 sampler pump will be started about August 2, 1956.

J-6 Precondenser: Identification of piping and valves, and lagging of service piping remain to be completed.

Canyon Wash-Down Facility: The 72 holes for the spray risers have been drilled in the canyon roof and preparation of sites for the pipe support pads is in progress. Because of higher priority work, the installation of instrument and spray piping will not be started for several weeks.

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

Revision two of the project proposal has been sent to the Financial Department for approval. It will then require the General Manager's approval before being submitted to the AEC.

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

Radiation zone boundary markers; and, electrical and water supply points have been provided for the contractor by Minor Construction. Construction of the facility is scheduled to start about 8-10-56. Procurement of equipment is continuing. The distribution system for routing acid from the absorber receiver tank to the dissolvers is being redesigned to provide better control and reduce the number of jumpers in the dissolver cells. The acid will be pumped to a header in the north sample gallery and will be distributed to the dissolvers by means of a control system to be provided by the recovered acid project.

h. CG-644 - Tail End Silica Gel Treatment

The project proposal for the reduction of authorized funds for design from \$60,000 to \$30,000 has been approved. Design is being completed by W. C. Nickum and Sons, Architect Engineers, and will be held until such time as the major facility is required. The prototype silica gel unit installed by Separations Process Technology has been transferred to Purex as a Manufacturing facility.

i. CG-647 - Iodine Removal Back-up Facilities

Excavation and pile driving for building foundations have been completed by Minor Construction. Hoffman Construction Company has been awarded the bid for the construction of this facility.

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

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

2. Plant Engineering

a. Maintenance Program

Based on an analysis of the accumulated preventive maintenance history on instrument equipment at Purex, several changes in inspection frequencies were established which will reduce the scheduled maintenance work load by approximately 1,380 maintenance manhours per year.

b. Maintenance of Standards

The labor standard for the UO_3 Plant was revised to include operating personnel for the prototype continuous calciner. Work is continuing on the labor standards for Recuplex and the 234-5 Analytical Laboratory. The steam and analytical service standards for the Purex Plant were issued.

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c. Engineering Assistance1) Design and Drafting

Progress continues on the over-all as-built drafting program. Items completed during the period include: 234-5 Coating Tripod; Pump and Agitator Gage Ring and Jackets; 202-S Silver Nitrate Reactor Heater Insulation; 200-E Area General Map; Interchangeable Electrical Connectors - 202-A and 202-S.

New drawings completed during the period include: Deep Well Pump Alterations; 2724-W Laundry Equipment Settings and Monorail; Cask Car Well Water Unloading Piping; and 221-U Cell Jumpers.

F. Reports Issued1. Routine

<u>Number</u>	<u>Subject</u>	<u>Author</u>
HW-44790	Separations Section Redox Plant Sub-Section Monthly Report - July, 1956	C.T. Groswith
HW-44747	Separations Section Metal Recovery Sub-Section Monthly Report - July, 1956	T. Prudich
HW-44779	Separations Section T Plant Sub-Section Monthly Report - July, 1956	C.B. Foster
HW-44701	Separations Section Z Plant Sub-Section Monthly Report - July, 1956	L.I. Brecke
HW-44785	Separations Section Radiation Monitoring Sub-Section Monthly Report - July, 1956	D.R. Koberg
HW-44721	Separations Section Analytical Control Sub-Section Monthly Report - July, 1956	L.M. Knights
HW-44745	Separations Section Projects and Personnel Development Sub-Section Monthly Report - July, 1956	O.V. Smiset
Official Use Only	Separations Section Power & Maintenance Sub-Section Monthly Report - July, 1956	C.P. Cabell
HW-44783	Separations Section Purex Sub-Section Monthly Report - July, 1956	V.R. Chapman
HW-44318	Purex Plant Process Control	C.R. Anderson by T.R. Workinger
None	Status of Projects, Informal Requests and Budget Items, July, 1956	V.D. Rouse
None	Separations Section Space Occupancy Report, July, 1956	V.D. Rouse
HW-44020 RD	TBP-UO ₂ Bldg. Production Schedules for July, 1956	H.F. Tew

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1. Routine (Continued)

<u>Number</u>	<u>Subject</u>	<u>Author</u>
HW-44021 RD	202-S Bldg. Production Schedules for July, 1956	H.F. Tew
HW-44022 RD	Purex Plant Production Schedules for July, 1956	H.F. Tew
HW-44023 RD	Z Plant Production Schedules for July, 1956	H.F. Tew
HW-44062 RD	Official Quarterly Forecast, Separations Section, July, 1956 through First Quarter FY 1959, Rev. 1	H.F. Tew
HW-44232 RD	Six Month Goal Forecast, July, 1956	H.F. Tew
HW-44015	Essential Materials Consumption for TBP Plant, June, 1956	M.A. Thress
HW-44016	Essential Materials Consumption for Redox Plant, June, 1956	M.A. Thress
HW-44017	Essential Materials Consumption for Purex Plant, June, 1956	M.A. Thress
HW-44018	Essential Materials Area Report to Cost and Purchasing, June 1 through June 30, 1956	M.A. Thress
HW-44019	Essential Materials Planning - July 1 through July 31, 1956	D.E. Peterson
HW-43895	Separations Section Waste Status for June, 1956	D.E. Peterson
HW-44565	Analytical Control Quality Report	A. Brunstad by C.G. Hough
HW-44484	Separations Section Process Council Minutes	E.G. Pierick

2. Non-Routine

HW-44537	Radiation Incident Investigation, Number 610-C	G.E. Backman
HW-44716	Radiation Incident Investigation, Number 111-C	G.E. Backman
HW-44006	Analytical Results on Sample Can Exchange Between HAPO and Rocky Flatsby	W.G. Browne
HW-44305	Task I Specifications for Purex Feed	W.G. Browne
None	Analytical Service Standard for the Purex Plant, 6-28-56	R.H. Silletto
HW-43968 RD	Essential Materials Standard for Purex Plant, 6-28-56	M. Pociluyko
None	Steam Standard for the Purex Plant 7-25-56	G.R. Ruzicka
HW-33589 REV	Unclassified - Revised Manual of Standard Practices 202-A Bldg.	C.R. Anderson by T.R. Workinger

III. PERSONNELA. Force Summary

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A. Force Summary

	<u>Start of</u> <u>Month</u>	<u>End of</u> <u>Month</u>	<u>Net</u> <u>Change</u>
Section General	1	1	0
Redox Plant Sub-Section	221	222	1
Metal Recovery Plant Sub-Section	260	260	0
Z Plant Sub-Section	182	182	0
T Plant Sub-Section	55	42	-13
Purex Plant Sub-Section	262	256	-6
Power & Maintenance Sub-Section	305	307	2
Projects & Personnel Development	57	56	-1
Analytical Control Sub-Section	220	220	0
Radiation Monitoring Sub-Section	164	162	-2
Section Total	1727	1708	-19

B. Safety

A Near Serious Incident, #56-30, occurred in 211 A pump house of the Purex Plant on July 3 resulting in a minor acid burn to one employee. Failure of a pump head gasket resulted in acid spray in immediate vicinity of pump. There were no disabling or medical treatment injuries during the month.

C. Radiation Experience

Two radiation incidents were investigated formally during the month, both occurring in the Metal Recovery Plant tank farms. In the 241-UR tank farm a process jumper in the 151-UR diversion box failed presumably while a process feed solution transfer through this jumper was in progress. The diversion box drain was sufficiently plugged to allow the diversion box to fill with process solution and overflow onto the adjacent ground area. Personnel exposure was insignificant (#610-C). In the 241-TX tank farm a process operator received an estimated 6 to 10 rads exposure to both hands when he attempted to take a process tank electrode liquid level measurement without adequate self monitoring. Contamination was spread to portions of the 271-TXR Building and to the survey meter the employee was carrying with him (#111-C).

Five curies of I^{131} were emitted during July with the major portion coming from the Purex Plant. Plant shutdowns contributed significantly to this unusually low emission.

Contamination fall out, which was later determined to be from one of the Pacific test atomic shots, was first detected at HAPO in the Purex Plant by low level shoe contamination cases. The maximum radiation level detected on horizontal surfaces was 1000 counts per minute. The contamination levels were low enough that it would not conflict with any normal operating conditions.

D. Personnel Activities

SECRET
Ed-15

1. Programs

During the month the training program activities were as follows:

<u>Program</u>	<u>Attendance</u>
For Non-Exempt Roll:	
GE Selection Program	7*
Safety Film - "Miracle of Paradise Valley"	200
Orientation Training	8
Advanced Rescue-Disaster Training	60
Process and Equipment Training	15

*1 R.M., 3 Power & Maintenance and 3 Operations personnel

2. Reduction of Force

Section totals remained at 1708 through July, with reactivations and changes in Radiation Monitoring personnel (exchanges with Reactor Section) responsible for maintaining the current level of people. Arrangements are now being made to transfer ten operating type people to other sections and departments. It is anticipated that another 10 to 15 operating people will be transferred to Metal Preparations to fill contemplated job openings.

3. Visitations

Mr. F. A. Valente, Mr. H. F. Clark, Miss S. J. Devol, Mr. W. F. Howard, Miss B. M. Moore, and Mr. A. S. Orton, of the Atomic Energy Commission, Washington, D.C., visited the 234-5 Building on July 10, 1956.

Mr. G. B. Adkins, Chief of Statistical & Mathematics Branch, Atomic Energy Commission, Washington, D.C., and Mr. W. L. Gilbert, Statistician, Atomic Energy Commission, Washington, D.C., visited the 234-5 Building on July 26, 1956.

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Ed-16

DECLASSIFIEDELECTRICAL UTILITY SECTION

July, 1956

I. RESPONSIBILITY

There were no changes in Section responsibility.

II. ACHIEVEMENTA. Operating Experience

Power Statistics (See last page for details)

Plant Contract

Probable time of July maximum demand....	2:30 - 3:00 p.m., July 12, 1956
Telemetered maximum demand for July.....	187,500 KW
Probable billing demand for July.....	190,000 KW
Probable energy consumption for July.....	120,869 MWH
Actual BPA metered maximum demand for June.....	188,951 KW
Actual billing demand for June.....	193,000 KW
Actual energy consumption for June.....	118,314 MWH
Average monthly energy consumption-12 months of.....	
Fiscal Year '56.....	111,676 MWH
Cost of purchased electricity for June.....	\$282,138
Actual cost of purchased electricity for 12 months.....	
of Fiscal Year '56.....	\$3,311,680

* * * *

At 7:50 a.m., July 7, a grass fire was reported near the 13.8 KV line west of the TC-4 Building in 200-E Area. The Fire Department was called out and extinguished the blaze with no difficulty. Subsequent investigation revealed that a fused switch located on a line pole had developed an arc and hot metal had dropped to the ground to ignite the grass. There was no loss or damage to property. The fused switch was changed out for a gang-operated switch.

* * * *

At 7:50 p.m., July 11, a differential relay action resulted in a total loss of power at the Hanford Substation. Linemen were called out and power was restored at 12:23 a.m. It was found that the wind had blown a tree limb into the 66 KV bus in the substation.

* * * *

The Electrical Utility Section system operating procedures currently are being revised to incorporate the changes and additions which will be necessary when the third 230 KV transmission line is placed in service.

SECRET
18-1

B. Equipment Experience

Two 230 KV in-service line splices, installed during original Plant installation, were examined under the preventive maintenance program. In order to detect any corrosion or heating due to poor contact in the initial assembly of these splices, two representative installations were x-rayed and one of these was later cut open for visual inspection and correlation with the x-rays. These splices were found to be in excellent condition and no further sampling or inspections will be made at this time.

* * * *

Mr. A. L. Rickley, Doble Engineering Company representative, visited here during a routine contact of customers. The methods employed in our testing of 230 KV oil circuit breaker bushings and results were discussed with our engineers. The Doble Company equipment was checked for proper calibration and recent changes in the test equipment were reviewed and explained.

D. Events Influencing Costs

Section costs incurred in delivering customer power during FY-1956 under-ran the annual goal by \$2,000, or .2 of one per cent. Purchased electricity under-ran the goal provision by \$89,000 due to delays in the CG-558 Project. The unit cost goal of \$1.78 average per kilowatt month was bettered by one cent.

* * * *

Overtime hours expended were 2.2 per cent of the total regular hours worked.

Attendance for the month was 98.60 per cent.

E. Plant Development and Expansion

CG-558: Minor Construction completed the installation of the steel tower structure replacing the wood secondary structure of the Y-side transformer in the 151-D Substation. This was done in order to support switches and conductors for the new third transformer.

* * * *

CA-586 No. 3 230 KV Line: Utility engineers participated in the preliminary inspection and noted several exceptions for correction by the contractor. The remaining contracted work of yard-stabilizing and connecting grounds will be completed during the first week of August. The line will be energized following carrier relay proofing and other tests and the Electrical Utility forces will then erect the in-line steel tower near Gable Mountain and tie in all line terminals.

* * * *

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HW-44587 DEL

E. Plant Development and Expansion Cont'd.

CG-613 4-X Program Metal Conversion Plant: Two 1,500 kva transformers and several spans of 13.8 kv line installed on a lump sum contract for the 224-U addition were energized and accepted by the Electrical Utility on July 25.

III. ORGANIZATION AND PERSONNELA. Organization

No changes in structure or nomenclature.

B. Force Summary

	Beginning	Ending	Net
Exempt Personnel	16	17	/1
Dispatchers	5	5	0
Electricians	11	11	0
Linemen	22	21	-1
Substation Operators	32	33	/1
Secretary	1	1	0
Stenographer	1	1	0
Clerks	2	2	0
Draftsman	1	1	0
	91	92	/1

C. Safety Experience

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

D. Radiation Experience

No incidents were reported during the month.

E. Personnel Activities

Section employees located in the 2101 Building participated in the practice Plant evacuation held on July 20. The test warning came at 8:30 a.m. and the staging area was reached at 9:25 a.m. O. Mageehon proceeded to the Mobile Civil Defense Unit located at Whitstran and performed assigned duties.

* * * *

O. Mageehon attended the eighth Conference at Association Island during July 23-25.

* * * *

G. A. Zeitler, electrical engineer in the rotational program, was assigned to this Section July 31, for three months' training.

Manager, *O. Mageehon*
ELECTRICAL UTILITY SECTION

O Mageehon:btz

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Ee-3

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

744 Hours

	ENERGY - MW HRS.		MAXIMUM DEMAND-KW		LOAD FACTOR-%	
	Last Month	This Month	Last Month	This Month	Last Month	This Month
230 KV System						
A-2 Out (100-B)	27790	29180	44500	49100	86.7	79.9
A-4 Out (100-D)	17590	16100	28600	29600	85.4	73.1
A-5 Out (100-H)	8360	8550	15600	15600	74.4	73.7
A-6 Out (100-F)	5720	6570	12900	13100	61.6	67.4
A-7 Out (100-KW)	23664	25581	38500	38000	85.4	90.5
A-8 Out (200 Area)	6740	6760	11100	10650	84.3	85.3
A-9 Out (100-KE)	23328	23760	39000	40000	83.1	79.8
TOTAL OUT	113192	116501	190200*	196050*	--	--
MIDWAY IN	115210	118200	184000	182400	87.0	87.1
115 KV System (300 Area)						
BB3-S4 Out	2424	2512	4320	4320	77.9	78.1
115-66 KV System						
B7-S10 Out (W. Bluffs)	126	156	630	630	27.8	33.3
Hanford Out (7200 V.)	23	22	--	--	--	--
Hanford In	130	157	900	900	20.1	23.4
Project Total In	117764	120869	189220*	--*	--	--

* Denotes Non-Coincidental Demand

Average Power Factor - 230 KV System 87.0

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PURCHASING AND STORES SECTION

JULY, 1956

I Responsibility

As a result of a management decision, J. A. Jones Company, effective August 13, 1956, will procure, receive and warehouse construction general supplies needed by Minor Construction.

II Achievement

	<u>STATISTICS</u>			<u>FY 1956</u>
	<u>May</u>	<u>June</u>	<u>July</u>	<u>Average</u>
<u>Purchasing</u>				
Emergency req'n rec'd.	188	276	294	361
Average per day	8.5	13.1	14	17.1
Purchase orders placed				
Number	2,111	2,014	2,365	2,416
Value	\$1,652,852	\$1,549,646	\$1,521,159	\$1,973,686
Purchase order alts.				
Number	348	275	350	286
Value	\$ 105,494	\$ 139,272	\$ 120,459	\$ 241,553
<u>Stores</u>				
General Supplies				
No. of store orders	29,404	34,644	23,647	30,402
Value of issues	\$ 328,615	\$ 419,630	\$ 254,554	\$ 328,645
Spare Parts				
No. of store orders	1,501	1,843	974	1,524
Value of issues	\$ 132,300	\$ 131,074	\$ 105,075	\$ 125,304
<u>Traffic</u>				
Savings freight bill audit	\$2,939	\$ 863	2,612	1,718
No. freight bills approved	1,359	1,253	1,118	1,543
Amount	\$ 269,070	\$ 215,464	\$ 187,403	\$ 284,655
Carload shipments received	748	537	587	832
Tonnage report				
Tons rec'd-common carrier	49,733	35,377	34,866	53,813
Total cost	\$ 304,568	\$ 210,465	\$ 270,738	\$ 308,758
Average cost per ton	\$ 6.124	\$ 5.949	\$ 7.765	\$ 5.782

II Achievement (Cont.)

The steel strike, which began July 1, 1956, had an immediate effect on orders involving steel fabrication on which all materials were not on hand. Quotations received covering similar work were all based on resumption of work in the steel industry, which in effect meant that there was no firm commitment for delivery. Settlement of the strike on July 27, 1956, meant that it would still require 10 days to 2 weeks to get furnaces back in operation, and approximately another 2 weeks after production was started before mill rolling schedules would be available.

Steel and Alloy Tank Company, Newark, N. J., is building two concentrators, and one of their major sub-orders placed for stainless steel plate resulted in the rejection of better than two-thirds of the order because of surface defections, laminations, or failure to pass the macro-etch or Huey tests. This extremely high rate of failure causes serious concern for the quality of the approximately one-third which did pass requirements, and the decision was made to use this material of dubious quality on other work, and request Steel and Alloy Tank Company to reorder the failed material from another source. The A.E.C. concurred with the General Electric decision and Steel and Alloy agreed to comply with our request.

The aluminum strike, which was expected to be averted, went into effect as of midnight July 31 1956. The strike is apparently friendly but production is completely stopped. Alcoa has offered the union the same package settlement accepted by the steel workers. Only disagreement appears to be whether or not there should be a 1-year contract or a 3-year contract. Alcoa is confident the strike will be of short duration. Essential Material aluminum inventory and order status is as follows:

1. Regular Caps and Cans - An approximate five-month inventory of each, as of today.
2. I. and E. Caps and Cans - This program will be delayed by the strike. An attempt was made to obtain at least 10,000 of each prior to August 1. The cans and 2,000 matching caps have been received. Eight thousand additional caps were to have been included in the late July pool car; however, they are now scheduled for late August, and this schedule is dependent on the length of the strike.
3. Aluminum Dummies - There is ten months' inventory of solid dummies and six months' inventory of tubular dummies. This latter item is being replaced by perforated dummies.

There is no inventory of perforated dummies. Eighty thousand are on order with Magna Mill Products, South Gate, California, with delivery scheduled for October 1. Aluminum plate for this order is scheduled for delivery to vendor August 4. They were shipped prior to the strike.

On expendable dummies, there is approximately 3.4 months' inventory. One hundred thousand are on order with Magna Mill Products, as above. Also an additional 75 000 pieces are left on an order with Kunz Brothers at Phoenix, Arizona. They have all material and are producing at the rate of 9,000 per week. Reactor Section can also reclaim enough dummies to

II Achievement (Cont.)

keep operating for several months in any emergency situation.

4. Aluminum Silicon - Approximately seven months' inventory, also 70,000 lbs. on order and currently scheduled for delivery one-half in November, 1956, and one-half in January, 1957.

Following is the status of experimental orders on caps and cans:

1. Reynolds Metal Company - They are now in the process of retooling and are going ahead with additional experimentation to produce acceptable components.
2. Harvey Aluminum - Caps - This experimental order is now essentially complete since we have received 96,000 pieces and the balance of 4,000 are expected this week. It still may take as long as nine months for complete production evaluation before Harvey can be used as a competitive source of supply for caps.

Cans - The pilot shipment of 4,800 cans received late last fall were not acceptable due to copper contamination. They have now completed move of presses to new, isolated location, and an additional 4,000 cans for test are promised for shipment August 17.

3. Hunter-Douglas - Caps - Initial shipment of 3,400 caps have been tested and found satisfactory. Vendor has been authorized to complete balance of order (96,000) and has advised that production rate will be approximately 9,000 pieces per week. Three thousand were shipped July 23 and 24,000 pieces were to have been shipped July 31.

Cans - All tests to date on the initial 4 000 cans have been satisfactory. Of these 1,200 are now being pile tested and results should be available in September. Balance of the order (96 000 pieces) will be produced after results of pile tests are approved.

On-plant tests are now complete and future shipments of regular aluminum cans will be received in the unwashed condition. This will result in a saving of approximately \$12/M.

In compliance with the Atomic Energy Commission's request of May 15, 1956 duplicate photostatic copies of all contracts, purchase orders, shipping orders and supporting papers pertinent to Sodium Dichromate procurement for the period November 1946 to present have been furnished. Also furnished was a list of persons who are or were associated with the procurement during the period plus a complete listing, in duplicate, of all material transmitted.

Procurement of equipment and material through the off-site excess utilization program resulted in a savings to HAPC of \$47,101.99 and since March, 1954, the amount saved is \$1,046,897.10.

II Achievement (Cont.)

Project CA-512R - Hanford Expansion 100-K Area. Six purchase orders remain open and one requisition is in process, and status of same is being reported by the Status Group. Existing open orders are expected to be completed during September, 1956.

Project CG-558 - Reactor Plant Modification for Increased Production. As of this date, there are 45 open purchase orders and five requisitions in process. It appears that all material on the above orders is scheduled to arrive on plantsite prior to the scheduled shutdown dates. However, from information received from the vendors during the month of July, the delivery of some items may be tight for the first shutdown. The power calculator systems, purchased from Foxboro Company on orders HWC-12882 and H6P-627 are well ahead of the original shipping schedules and will be in time for scheduled shutdowns. By working closely with the vendor improvements in delivery time from three to twelve weeks were effected; this was a major accomplishment in the electronic and instrument industry. Another critical order with Grinnell Company, H6S-5984, was shipped complete and on time through very close expediting work. This covered 49 eight-inch gate valves.

Project CG-613 - Hanford 4X Program Metal Conversion Plant. The last open order of this project was received late in July--the conveyor from M-E Standard Company (It is at present being modified by Minor Construction in White Bluffs.)

Project CG-621 - Redox Contamination Control Facilities "E" Cell Ozonization. As of this date, there are 14 open purchase orders and two requisitions in process which are being handled by the Off-Site Liaison Group. Every effort is being made to meet required dates. However, most of these orders were affected by the steel strike.

Project CG-647 and CG-648 - Back-Up Radioiodine Facilities - Purex; Auxiliary Radioiodine Removal and Nitric Acid Recovery Facilities - Redox. As an expedient for orders H6V-10711 and H6V-10715, fabricated vessels, Purchasing accepted a delegation of authority from Engineering to write requisitions and store orders for orders for steel required by vendors, depending upon availability. This shortcut has resulted in quick procurement and shipment to vendor. Another interesting development on these projects was the utilization of suspect and rejected stainless steels from the concentrator order mentioned above. This material has actually improved delivery on these critical vessels.

Contracts executed during month

RO-22-Mod. 1

Seller: Lehigh Safety Shoe Company

Material: Safety Shoes

Term: 1-1-56 to 12-31-56

Price: Mod. 1-Increases price to \$8.72 and \$9.12 per pair.

G-72, Mod. 1

Seller: Battelle Memorial Institute

Service: Research investigations of moderator graphite

Term: Mod. 1 extends term to 12-31-56

Price: \$23,800.

II Achievement (Cont.)

MRO-2

Seller: The Travelers Indemnity Company
Service: Inspection of boilers pressure vessels, elevators and shop fabrications and installations
Term: 6-1-56 to 5-31-57
Price: \$45 per 8-hour day plus transportation and subsistence expenses.

MRO-5

Seller: Abadan - Spokane
Service: Servicing Ozalid equipment
Term: 7-1-56 to 6-30-57
Price: \$55 per machine serviced: Maximum \$440.

CA-135

Consultant: Dr. P E. Church
Service: Consultant - Radiological Sciences
Term: 4-1-56 to 3-31-57
Price: \$50 per day that the consultant performs services; travel expenses.

CA-141

Consultant: William L. Shannon and Stanley D. Wilson
Service: Disposal of Radioactive Wastes
Term: 7-8-56 to 7-7-57
Price: \$100 per day for services rendered; transportation and subsistence.

CA-142

Consultant: Warren J. Kaufman
Service: Disposal of Radioactive Wastes
Price: \$80 per day for services rendered; transportation and subsistence
Term: 7-8-56 to 7-7-57.

CA-144

Appraiser: Hugh H. Russell
Service: Appraisal Services
Price: \$150 plus transportation and subsistence
Term: 30 days after receipt by Appraiser of Notice to Proceed.

DDR-8

Seller: State College of Washington
Material: Design and fabricate a hydraulic model of water wall
Term: Complete 210 days after the date of receipt of notice to proceed.

II Achievement (Cont.)

Three sealed bid sales of surplus property held during July brought a total sale return of \$76,023. Since Stores assumed the responsibility for disposal of excess and surplus property by public sale the amount of return has totaled \$497,736.

Preliminary action has been taken to facilitate transfer of medical supplies to the new management of Kadlec Hospital on September 8, 1956. Work sheets have been set up showing a three months' supply of general supplies items for Kadlec Hospital, Industrial Medicine and Biology Section, including surplus stock. It is planned to transfer a sufficient supply of each item to Kadlec Hospital to meet their usage requirements from now until September 8 1956, plus the initial three months supply. Items which are in short supply are now being requisitioned. Items which are in excess of Kadlec's requirements will be returned to Stores if needed by Industrial Medicine or Biology. In addition work sheets listing all spare parts applicable to the hospital were prepared and forwarded to the hospital management for review and were returned showing what items were required. These items were delivered to the hospital and the balance of the items not needed have been declared excess. This action closes out the hospital spare parts account.

Materials accumulated and stored in 101 Building during the strike against J. A. Jones Co. have been moved from inside storage in Building 101 except one large shipment of insulation. It is planned to retain this material at Building 101 until the field requires its use which is expected within the next 30 days. There still remains several shipments stored on the concrete pad adjacent to Building 101 which will also be retained at that location until required for installation.

The operations of the White Bluffs automotive parts warehouses was re-scheduled on July 16, 1956 for part time service only and responsibility for operation on this basis was given to automotive parts personnel located in Building 1171, 1100 area. This action eliminated a full time stockroom keeper for another assignment.

During the past month a total of 43 items of vacuum tubes were transferred from Spare Parts to General Supplies in line with a plan to consolidate all vacuum tubes, except those having special use to General Supplies into one location where they will be readily available for plant wide usage.

III Organization and Personnel

Force Summary

Component	6-30-56			7-31-56			Change			
	Ex.	N.Ex.	T.	Ex.	N.Ex.	T.	Ex.	N	Ex.	T.
General	2	2	4	1	2	3	(1)	-		(1)
Contract Unit	2	2	4	2	2	4	-	-		-
Traffic	3	7	10	3	7	10	-	-		-
Purchasing Sub-Sec.	42	62	104	43	58	101	1	(4)		(3)
Stores Sub-Section	12	165	177	12	158	170	-	(7)		(7)
	61	238	299	61	227	288	-	(11)		(11)

III Organization and Personnel (Cont.)

Safety Experience

Six medical treatment injuries were reported.

Thirteen safety and security meetings were held with a total of 223 employees attending.

R. L. Carlson recently visited the General Services Administration Office in Kansas City, Missouri. The purpose of his visit was to review their automated data processing inventory management system which has been operating satisfactorily for the past five years.

**TRANSPORTATION SECTION
MONTHLY REPORT
JULY 1956**

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Transportation Section personnel forces decreased from 493 to 490 by one new hire, two transfers in, two terminations, and four transfers out.

Transportation Section gross operating costs for FY 1956 totaled \$4,126,766 and were \$32,000 or 0.77% under the budget. This compares with FY 1955 total costs of \$4,062,815 which were \$131,883 or 3.14% under the budget. The over-all cost increase of \$63,951 or 1.57% in FY 1956 over FY 1955 is slightly less than the increase in salary rates. Listed below is the performance of each organizational unit and the landlord functions:

<u>Component</u>	<u>FY 1956 Costs</u>	<u>FY 1956 Budget</u>	<u>FY 1955 Costs</u>
General	\$ 59,899	\$ 62,361	\$ 50,686
Rail Operations	770,212	772,209	753,968
Bus Operations (gross)	1,542,489	1,575,571	1,485,796
Heavy Equipment Maintenance	1,104,118	1,082,048	1,032,448
Light Equipment Maintenance	919,623	939,661	971,768
Track Maintenance	368,407	372,975	384,142
Road Maintenance	860,621	843,164	836,642
Records and Equipment Control	88,206	92,290	86,974
Landlord - 600 Area, etc.	19,571	29,004	28,937
Landlord - Consol. Transp. Facility	111,619	111,424	66,809 *

* Last six months only.

Listed below are comparative costs for major functions:

<u>Function</u>	<u>FY 1956</u>	<u>FY 1955</u>	<u>Variance</u>
Railroad	\$ 770,212	\$ 753,968	+ 2.15 %
Plant Bus	1,432,276	1,360,827	+ 5.25 %
Heavy Equipment Maintenance	634,441	581,821	+ 9.04 %
Light Equipment Maintenance	607,019	665,468	- 8.78 %
Road Maintenance	171,436	100,485	+ 70.61 %

Achieved unit cost bogeys and bettered FY 1955 performance for light equipment maintenance, track maintenance, seal coating of Plant roads, and operating the Plant bus system. Road maintenance expenditures exceeded the goal by about 34% due to abnormal ice and snow removal. The average cost per railroad car handled exceeded the goal by \$0.86 or 1.6% as actual cars were 4.7% below the predicted volume. Listed below is a comparison of FY 1956 unit cost statistics with the performance bogeys and FY 1955:

	<u>FY 1956</u>	<u>Bogey</u>	<u>FY 1955</u>
Railroad			
Cost per car handled - Commercial	\$ 31.63	\$ 29.73	\$ 31.46
Process	253.38	232.40	241.89
Average	53.20	52.34	52.97

	<u>FY 1956</u>	<u>Bogey</u>	<u>FY 1955</u>
Plant Bus			
Cost per mile - Operating	\$.3852	\$.4173	\$.4043
Maintenance	.1347	.1281	.1268
Total	.5199	.5454	.5311
Light Equipment			
Cost per mile - Maintenance	.0588	.0689	.0614
Road Maintenance			
Cost per mile - Yearly	424.52	317.74	250.67
(Primary roads based on 20' roadway seal coating not included)			
Seal coating - per square yard for surfaced areas	.0905	.1108	.1134
Track Maintenance			
Cost per mile yearly	2,535.68	2,577.18	2,698.82

Transportation Section material inventories were reduced from \$279,585 at 6-30-55 to \$210,460 at 6-30-56. The reduction of \$69,125 or 24.7% provided ending balances well below the budget. The inventory of repair parts is near the goal for CY 1956 following reductions of about \$25,000 from excessing and transfers to White Bluffs.

Received a directive from the Commission relative to the HOO Reserve Construction Equipment Pool. Steps are being taken to excess 31 units for disposal in the September auction. AEC work orders totaling approximately \$15,000 have been received to ready 67 units for long-term storage. Repair parts (approximately \$273,000 first cost) retained at White Bluffs for major construction program for the overhaul of the HOO Pool units will now be sold or transferred to current use inventories.

Required Schedules for the Annual Motor Vehicle Report have been completed in accordance with the Commission's request of August 30, 1955. Representatives of the Financial Department and the Transportation Section collaborated in the preparation. Advisory assistance by HOO personnel was very helpful from an interpretive standpoint and reconciling data with the previous year. The following significant items were included in the narrative transmittal:

"Average vehicle age was decreased from 6.0 years to 5.5 years through the acquisition of new and upgrade units to replace older equipment. Even so, 44% of the fleet is composed of 1950 models or older. This compares with 5.3 years and 31% six years old or older at the end of FY 1955 for all government-owned vehicles as reported by the General Services Administration.

"Expenditures and statistical data for the over-all fleet are substantially lower due to the absence of major construction in FY 1956. It is noteworthy that total operating and maintenance expenses decreased 37.8% compared to a reduction in mileage of 27.7%. The average cost per mile decreased from \$.0752 to \$.0648, whereas an increase would have been the normal expectation. Economies were realized from the following:

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- a. Discontinuance of the more costly vehicles engaged in major construction service.
- b. Improved age of the fleet and restrictive maintenance on vehicles in advance of replacement.
- c. Refinements in the maintenance program such as the extension of intervals for Class A inspections, reduction in engine overhauls, establishment of job time standards, and extensive use of testing equipment at the new Consolidated Transportation Facility."

The General Services Administration has proposed several changes in the content of the Annual Motor Vehicle Report for FY 1957. The Commission has been supplied with our comments. Notable revisions are the inclusion of depreciation, detailing of overhead costs, and segregated reporting of expenditures not common to all agencies. The requirements are more clearly defined and should produce meaningful information with greater uniformity.

Several changes of an accounting nature were placed into effect for the new fiscal year to satisfy the revised requirements for the Annual Motor Vehicle Report and to provide more effective reporting of costs by organization and function.

New contracts for fuels and lubricants are generally higher. These with the increased federal tax on gasoline, tires, and tubes from the new highway law will result in increased costs of more than \$20,000 in FY 1957.

Transportation Section personnel participated in the nation-wide civil defense test on July 20. A bus was dispatched to each of the ten schools in Richland and evacuated a total of 75 people to the various staging areas. Water trucks and patrol graders were on standby duty at the staging areas in the event of fire or stalled equipment. The three civil defense vans were moved to the designated temporary headquarters at Whitstran. All aspects of this activity were accomplished without incident.

The annual physical inventory of Road Materials (0420-930) was conducted on July 26.

Recommendations on Disabling Injury No. 56-115 continued to receive attention. The full order of oscillating lights has been received from the manufacturer. Three have been mounted on locomotives and the remaining five are to be installed by the end of August. Railroad crossing safety continues to receive publicity through the media of the GE News and safety meetings.

Commercial rail traffic during July decreased 21% over June due to the cessation of coal receipts from July 9 through 22 (Coal Miner's Annual Holiday). The following recapitulation indicates the distribution of commercial cars handled:

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<u>Cars Handled</u>	<u>Loads In</u>	<u>Empties In</u>	<u>Loads Out</u>	<u>Empties Out</u>
General Electric Company	500	7	24	469
U. S. Army	38	0	0	46
J. P. Head Co.	8	0	0	5
The Royal Co.	1	0	0	1
Tri-State Painting Co.	1	0	0	1
Anning Johnson Co.	<u>1</u>	<u>0</u>	<u>0</u>	<u>1</u>
Total	549	7	24	523

Railroad process service during July decreased 60% over June due to production difficulties.

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

Completed the installation of new wheels on locomotive 39-3729. Wheels were removed from locomotive 39-5933 and sent off-plant for the restoration of flange and tread contours.

Maintenance of railroad trackage and associated activities required 6,246 man-hours.

The Plant Bus System transported 1.5% fewer passengers in July than in June. The following recapitulation indicates the volume of service rendered:

Total Passengers	160,597
Revenue - Bus Fares	\$ 7,661.20
Earnings - Transit Advertising (June)	\$ 160.08
Bus Trips	6,378
Bus Miles - Passenger Carrying	202,746
Passenger Miles	5,690,562

Operation of the Richland Bus System was discontinued on June 30 as planned. The following recapitulation indicates the volume of service rendered from June 26 through June 30:

Total Passengers - Including Transfers	871
Revenue - Bus Fares	\$ 61.85
Earnings - Transit Advertising (June)	\$ 7.28
Bus Trips	207
Bus Miles - Passenger Carrying	1,097
Passenger Miles	2,171

Off-Plant chauffeured automobile trips (Company business and/or official visitors) totaled 173 and were rendered to the following locations:

AEC Airport	1
Benton City, Washington	6
Grandview, Washington	3
Hinkle, Oregon	9
Kennewick, Washington	42

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Pasco, Washington	57
Pendleton, Oregon	14
Prosser, Washington	10
Sunnyside, Washington	13
West Richland, Washington	11
Yakima, Washington	5
Finley, Washington	1
Wishram, Washington	1

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

	<u>Gasoline</u>	<u>Diesel Fuel</u>	<u>50 Cetane</u>	<u>Kerosene</u>	<u>White Gas</u>
Stock at Start of Month	66,260	17,815	13,600	2930	250
Received During Month	78,847	19,200	27,469	7500	330
Disbursed During Month	81,850	15,790	29,419	850	252
Stock at End of Month	63,257	21,225	11,650	9580	328

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

Motor Overhauls	41
Class A Inspections and Repairs	80
Class B Inspections and Lubrications	1009
Weekly Inspections - Fuel Trucks and Off Plant Vehicles	133
Semi-monthly Inspections - Buses	254
Monthly Inspections - Railroad Rolling Stock	10
Front End Alignment and Wheel Balance	106
Routine Maintenance Repairs and Service Calls	1465
Body Repairs	49
Tire Repairs	521
Wash Jobs	<u>373</u>
	4,041

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

<u>Code</u>	<u>Type</u>	<u>No. of Units</u>	<u>Total Mileage</u>
1A	Sedans	398	566,969
1B	Buses	162	262,772
1C	Pickups	463	270,232
1D	Panel, Carryall, Sta. Wagon	162	142,707
1G	Jeeps	3	1,426
1H	Power Wagons	48	22,474
68 Series	Trucks	<u>200</u>	<u>113,346</u>
		1,436	1,379,926

[REDACTED]

Maintenance of Plant roads and the production of road aggregate materials required 1725 man-hours

The following tabulation indicates in tons the volume of asphaltic material handled during July for road maintenance:

	<u>MC 3</u>	<u>MC 5</u>
Stock at Start of Month	9.39	33.39
Received During Month	38.82	0
Used During Month	19.50	21.00
Stock at End of Month	28.71	12.39

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

	<u>Pre-Mix 1/4" to 0 Tons</u>	<u>Pre-Mix 3/4" to 0 Tons</u>	<u>Chips 1/2" Cu.Yd.</u>	<u>Chips 5/8" Cu.Yd.</u>	<u>Crushed Rock 1/4" Cu.Yd.</u>	<u>Crushed Rock 3/4" Cu.Yd.</u>
Stock at Start of Month	422	254	1,640	4,795	1,048	1,092
Made During Month	362	0	240	0	0	2,270
Used During Month	481	48	985	130	234	177
Stock at End of Month	303	206	895	4,665	814	3,185

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DECLASSIFIEDENGINEERING DEPARTMENTJULY 1956PILE TECHNOLOGY SECTION

Considerable emphasis will be placed on the technology of organic coolants. Progress to date consists of designing and fabricating an in-pile test section, and designing and procuring components for the associated test loop, which will permit irradiation of the organic materials to determine radiation damage effects. A separate out-of-pile loop is being constructed to obtain information on coking effects as a function of heat flux, velocity, and coolant composition.

Sufficient good quality I & E slugs containing cores of 1.44 percent U-235 are now available for pile charging to pilot performance at high specific powers.

Detailed design of the gas-cooled recirculating loop for the Army Reactors Branch has been authorized.

SEPARATIONS TECHNOLOGY SECTION

Operation of the Redox Plant was resumed during the month after the serious contamination incident in the 233-S Building. During the extended shutdown for plant contamination clean-up a plutonium precipitation was observed in vessels containing hexone; the pertinent chemical conditions were defined and procedures for preventing a recurrence were developed.

The Purex plant was shut down, flushed, and started processing high g/t fuel. Operations of the plant were again suspended because of an excessive accumulation of siliceous solids and plutonium in the product concentration equipment. Causes and remedial procedures are being studied.

Studies with the profile pulse column indicate that the entrainment of solids grossly distorts the theoretical distribution of zirconium-niobium in Purex extraction columns, and limits the decontamination factor obtainable under some operating conditions.

Exploratory work indicates the feasibility of using anion exchange for the recovery of plutonium from Purex wastes, and further investigations are planned.

The prototype calciner was completed and shakedown runs are in progress. Desirable modifications of the shaft seal were developed and recommended for the plant units.

DESIGN SECTION

Total engineering and drafting man-months expended on Design Section managed projects and customer work increased substantially during July while effort on design development programs and process technology showed a corresponding decrease. Distribution of effort by major components for the month of July was as follows:

Percent of Total Effort

Design Development Programs	31.8
Design Section-Managed Projects	47.9
Advance Engineering - FY 1957 & FY 1958	2.0
Process Technology	0.3
Customer Work	18.0
	100.0

Studies were completed during July of the cost of fabricating various types of fuel elements which are being evaluated in connection with engineering feasibility studies of a gas-cooled production reactor. Alternate fuel element jacketing materials considered include coextruded zirconium and electroplated iron. Costs of the fuel elements studied range from \$1.65 to \$7.67 per pound of uranium. Other metallurgical design development activity during the month included studies of the application of induction preheating units to slug, can and cap assembling equipment, and preparation of specifications and preliminary drawings for automatic welding and cut-off equipment.

A report was issued during the month containing a preliminary discussion of the results of studies of improved production reactor technology. Among the conclusions presented in this report are (1) that the graphite moderated, water cooled reactor concept best meets the functional and schedule objectives of the improved production reactor program, and (2) that development emphasis should be placed on the attainment of coolant temperature conditions suitable for efficient power recovery. Other reactor design development activity during July included studies of modifications necessary to sustain higher process water flow rates in the 100-K Area, studies of the use of organic reactor coolants, studies of the modification of an existing reactor for electric power recovery, and evaluation of prototype temperature monitoring and flow monitoring system components.

The report, "A Redox Process Two-Cycle Plant Study," was issued during the month summarizing the results of design development studies of a new separations plant which would utilize a simplified Redox-type flowsheet. Studies were continued during July of building and equipment modifications which would be required to provide for a Phase IV capacity increase in the Redox Plant.

Work continued during the month on the preparation of a limited scope package for a new plutonium producing reactor embodying a recirculation cooling system. Design criteria for the thermal shield, biological shield, ball safety system, and pile gas system were approved by the Design Council during July.

PROJECT SECTION

At the end of July, construction completion status of major process facilities was as follows:

<u>Project No.</u>		<u>Completion</u>	
		<u>Scheduled</u>	<u>Actual</u>
CA-512	1706 KER Recirculation Facilities	98%	96%
CA-513-E	Purex Facilities, Part E	54%	52%
CG-558-I	Reactor Plant Modifications	68%	66%
CG-558-II	Reactor Plant Modifications	90%	13%

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Project No.

		<u>Completion</u>	
		<u>Scheduled</u>	<u>Actual</u>
CG-598	Purex Acid Fractionator	94%	65%
CG-600	100-C Alterations	5%	0.8%
CG-613	Hanford 4X Programs, Metal Conversion Plant	65%	72%
CG-621	Redox Contamination Control Facilities	74%	54%
CG-643	Redox Capacity Increase, Phase III	90%	90%
CG-647	Back-up Radioiodine Removal Facility, Purex	Not Sch.	3%

Construction progress was generally impeded by shortage of craftsmen and unbalanced craft crews. Priorities for use of labor were continued on major projects to the degree that craftsmen were available. The primary concern on Minor Construction work was the critical shortage of welders. This shortage was partially counteracted by the execution of a fixed-price contract for shop fabrication of front face piping to be used in 100-D, DR, F, and H Areas. The present welder strength is being increased by additional qualifications according to HAPO standards, and the total work force is being enlarged correspondingly.

The steel strike exerted temporary limitations on all HAPO orders except those that are being fabricated by independent steel mills. However, these limitations will be reduced by settlement of the steel strike.

ADVANCE ENGINEERING

A rough draft of a report on the preliminary studies of reactors for the Plutonium Fuel Cycle Demonstration Reactor has been prepared and circulated for comment in preparation for the visit here on August 8 and 9 of the delegation from the Washington AEC. Of the four reactor concepts considered, the graphite moderated and the heavy water moderated types are considered to be preferable to the light water moderated and graphite fringe-driven types from the standpoint of plutonium cycle demonstration, experimental flexibility, auxiliary testing, and power reactor applicability.

Following a meeting on natural uranium power reactors attended by F. W. Albaugh in Washington, a preliminary study is in progress. Heavy water cooling has been found to have distinct advantages in this type of reactor by allowing considerable latitude in the coolant to fuel volume ratio, an important consideration when uranium oxide fuel is used. Both graphite and heavy water are satisfactory as moderators in conjunction with heavy water cooling.

ENGINEERING ADMINISTRATION

Responsibility for the operation of the Legal Library in the 703 Building was transferred from the Hanford Operations Office to the Plant Library. Since the Legal Library has not had any professional direction, a considerable amount of work must be done to bring it up to standard.

Mr. George B. Adkins, Chief of the Mathematical Statistics Branch, and Mr. William E. Gilbert of the same branch, Division of Nuclear Materials Management, AEC, Washington, D. C., visited the Statistics Unit on July 25, 1955. The purpose of the visit was primarily for indoctrination of Commission personnel and discussion of application of statistics to accountability problems.

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ORGANIZATION AND PERSONNEL

Total on Roll, June 30, 1956
Net Change

1,444
+29*

Total on Roll, July 31, 1956

1,473

* Includes 11 summer employees on temporary assignments in Pile Technology Section.

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W. M. Hartley
for MANAGER, ENGINEERING

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ENGINEERING ADMINISTRATION SECTION

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TECHNICAL INFORMATION UNIT

Responsibility for the operation of the Legal Library in the 703 Building was transferred from the Hanford Operations Office to the Plant Library. Since the Legal Library has not had any professional direction, a considerable amount of work must be done to bring it up to standard.

Classified Files' daily operation was converted to IBM's 702 machine, culminating many months of programming and study. Considerable work was done to (1) locate and correct errors incidental to the conversion, and (2) re-program the inventory "pass" which did not work satisfactorily. By the end of the month, daily operation was proceeding smoothly.

A summary of long-term objectives for fuel element classification has been submitted to the HAPO members of the Classification Committee for evaluation. It is hoped that these objectives can be incorporated in future revisions of the proposed Fuel Element Classification Guide.

STATISTICS UNIT

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

Mr. George B. Adkins, Chief of the Mathematical Statistics Branch, and Mr. William E. Gilbert of the same branch, Division of Nuclear Materials Management, AEC, Washington, D. C., visited with Unit personnel on July 25, 1956. The purpose of the visit was primarily for indoctrination of Commission personnel and discussion of application of statistics to accountability problems.

For the Engineering Department

Rupture data analyzed during the month were concerned primarily with two types of slugs. In one production test, which was of the run to rupture type, one tube of powdered met slugs was exposed to failure and compared with a full charge of normal production slugs similarly exposed. The second rupture analysis dealt with an evaluation of cored slugs with crimped end plugs. Experience data pertaining to cored slugs were broken down into two main classes, drilled and extruded, with the appropriate analyses being performed on the resulting curves of rupture rates versus exposure.

Work was performed on two studies dealing with experimental design. One was concerned with the use of enriched slugs in piloting to higher pile powers. The assumption made is that the use of enriched slugs in testing programs is comparable to raising the power levels of the piles by the appropriate amounts. An experiment was designed to determine whether or not this is a valid assumption. The other design was concerned with the evaluation of canning variables

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as they affect yields of I and E slugs. A report on this completed study is currently being prepared. Results obtained subsequent to the experiment and using the indicated set of conditions show a substantial improvement in I and E slug yields.

Two types of slugs were evaluated with respect to warp and diameter change characteristics during the month. One type was the I and E slug. Data from a production test involving five charges of I and E slugs and four charges of normal control slugs were submitted for analysis. In the warp analysis, allowance was made for the fact that the I and E slugs required less total warp to cause a stuck charge than do normal slugs. The other analysis dealt with data arising from ingot quality studies, in which three groups of slugs were compared with one another.

Data from measurements recorded for a number of brass standard slugs by the C Basin II Dimensioner were analyzed in order to evaluate the dimensioner with respect to its accuracy and precision in measuring warp, length, diameter changes, and ellipticity.

A review of the statistical methods used in estimating the maximum penetration of AlSi into uranium and vice-versa in bonded discs was made during the month, with a detailed report being issued on this.

For the Manufacturing Department

Work was done during the month on the problem of determining the best type of function to relate specific gravity of solution to the time required for a drop of solution to travel a fixed distance in a falling drop tube. Several functions were studied to determine which function would consistently represent falling drop calibration data best. The function obtained, as well as other information, was presented in a report to Separations Section personnel.

Work was completed on the problem of determining an accountability factor for charging to waste the plutonium remaining in the slag and crucible slurry in the Recuplex operation.

Statistical work on one phase of the program of establishing radiation exposure limits for the various operations in Z plant was completed during the month.

Other statistical work for 200 Area operations was concerned with: (1) Providing assistance in the design of an experiment to determine which of the operation variables associated with the furnaces in 200 Area power houses have a significant effect upon the efficiency of the furnaces; (2) assisting in formulating the method of handling data to obtain estimates of the expected life of some equipment in Separations Plants; (3) devising a sampling method to estimate the percentage of time that the maintenance employees in the Redox Plant are engaged in productive effort; (4) providing assistance to estimate the laboratory precision to be associated with δ /AT results for the samples taken from the final tank in the Purex Plant.

Work continued on the review of the acceptance sampling program for incoming caps and cans. This review is nearing completion and a letter will be forthcoming. The details of the study will be presented in the letter, as well as recommenda-

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tions to eliminate some of the magnitude of inspection.

Assistance was provided in obtaining parameters of data resulting from checking thermocouples in the canning furnaces. The purpose of this study was to assist 300 Area operations personnel in determining the feasibility of reducing the amount of inspection. Assistance was also provided 300 Area operations personnel in setting up control charts on the misclassification rate of canned slugs.

For the Radiological Sciences Department

An analysis was made of data obtained from an experiment conducted by Biology Section personnel to determine the relative effects of organically bound Sr^{90} versus spiked Sr^{90} in ewes and their lambs. Also for Biology Section personnel, an experiment was designed to determine the relative merits of two growth hormones and/or calcium EDTA for treating plutonium radiation in rats. In connection with work being performed by Radiological Engineering Section personnel on total activity sent to ground from scavenged waste tanks, a formula was derived which gives the number samples that should be taken from a tank as a function of the volume in the tank and the required precision. This formula should be very useful since based on the estimate of activity obtained for a tank, this estimate coupled with a volume to ground value would then give the number of cribline samples to take when the material is actually sent to ground.

For the Employee and Public Relations Department

An analysis was made of data obtained from a study conducted by personnel of the Personnel Practices Section concerning prediction of employees ratings from test results. A sampling method was developed at the request of personnel of the Health and Safety Section for surveying the City of Richland to obtain estimates of the age distribution of the population of residents. The results of the survey should be available shortly. Assistance was provided personnel of the Employee Communications and Public Relations Section in the design of a questionnaire and the planning of a survey to obtain employee attitudes toward the Health Bulletin publications. And assistance is being provided to personnel of the Education and Training Section in the analysis of data obtained from two questionnaires used to obtain attitudes and opinions of new technical and business graduates toward the "Introductory Program" and "Recruiting."

For the Operations Research and Synthesis Section

Statistical assistance has been requested by personnel of the Operations Research and Synthesis Section on a study of past slug rupture data being conducted by personnel of this section. The statistical evaluation of these data will be for the purpose of attempting to pin point those variables that influence rupture performance. Actual statistical evaluation will begin in the near future when data processing on the IBM 702 machine is completed. Also for personnel of this section, an analysis was made to determine the applicability of using the "Learning Curve" technique to predict future reactor tube replacement time.

WM Harty

WM Harty
Manager - Engineering Administration
ENGINEERING DEPARTMENT

FILE TECHNOLOGY SECTION

July, 1956

VISITORS

Paul Berner, Star Machinery Company, Seattle, Wash., spent July 5-6 at HAPO discussing fabrication techniques and equipment.

W. M. Cashin, KAPL-Schenectady, visited HAPO on July 12 regarding x-ray diffraction on U-Zr alloys.

W. L. Fenn and A. T. Scattergood, Fenn Manufacturing Company, Hartford, Conn. visited HAPO to discuss fabrication techniques and equipment, July 5-6.

M. R. Harris, P. L. Kane and W. J. Ramsey, UCRL-Livermore, Calif., visited HAPO, July 26-27, to discuss administrative matters for Whitney program FY-1957.

R. L. Johnson and D. W. Richardson, U.S. Bureau of Mines, Albany, Oregon, visited HAPO on July 18 to discuss zirconium scrap disposal.

Dr. H. C. Schweinler, ORNL-Oak Ridge, Tenn., spent July 17-18 at HAPO discussing radiation damage problems.

TRIPS

J. A. Ayres visited KAPL-Schenectady, July 11-13, for discussions on corrosion problems. Mr. Ayres attended a conference on corrosion of aluminum and gave a report on HAPO activities at KAPL on July 25.

J. A. Ayres, W. T. Kattner and E. A. Weakley spent July 9-13 at the duPont-Savannah River Plant, Augusta, Ga. for discussions on fuel element technology.

R. E. Baars discussed Army Gas Loop at Army Reactors Branch, Washington, D.C. July 16-17.

L. P. Bupp attended meetings at Association Island, July 9-11.

S. H. Bush consulted on Hanford assistance program at BMI-Columbus, Ohio, July 23-27 and at KAPL-Schenectady on July 30. Mr. Bush attended AEC Radiation Effects Review meeting held in Chicago, July 31.

J. J. Cadwell and D. C. Kaulitz discussed fuel element fabrication techniques, equipment, etc. at Nuclear Metals, Inc., Cambridge, Mass. and Metals & Controls, Attleboro, Mass., July 30-31.

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G. T. Geering observed GEH-4 experiments at Phillips Petroleum, Idaho Falls, July 5-11.

S. Goldsmith and R. S. Kemper observed methods of zirconium scrap disposal at U.S. Bureau of Mines, Albany, Oregon on July 6 and July 7-9, respectively.

B. R. Leonard, Jr. attended International Conference on Nuclear Reactions at Zeeman Laboratorium, Amsterdam, Netherlands, July 1-7; attended Tripartite Conference on Neutron Cross Sections at Atomic Energy Research Establishment, Harwell, England, July 9-13; discussed cross section measurement techniques and inspected their experimental equipment for nuclear physics measurements at Centre D'Etudes Nucleaires de Saclay, Saclay, France, July 24-25.

M. Lewis presented a paper at Radiations Effects Review at AEC, Chicago, on July 31.

J. E. Minor consulted on fuel element development at KAPL-Schenectady, July 23-26.

J. E. Minor and S. H. Bush observed GEH-4 experiment and attended ETR Experiments Review Meeting at Phillips Petroleum, Idaho Falls, July 17-19.

J. W. Riches visited the University of California, Berkeley, to confer on creep of aluminum, July 9-10.

E. A. Smith attended Symposium on Light Metals Casting at Seattle, Wash., July 20.

W. P. Wallace visited Nuclear Metals, Boston, Mass. on July 29 regarding fuel element fabrication.

O. J. Wick, L. J. Chockie and J. W. Goffard attended Symposium on Casting Techniques at Rolle Mfg. Co., Seattle, Wash. on July 19.

N. G. Wittenbrock visited the University of California, Berkeley, July 8-10, for consultations on aluminum creep studies.

F. W. Woodfield attended meetings at Association Island, July 4-6.

ORGANIZATION & PERSONNEL

	<u>June 30</u>	<u>July 31</u>
Administrative	2	2
Pile Engineering	108	114
Pile Materials	75	75
Fuel Technology	118	122
Physics Research	46	50
Metallurgy Research	83	93
Contact Engineering	4	4
Technical Administration	<u>10</u>	<u>10</u>
Totals	446	470

Pile Engineering: A. G. Blasewitz, Unit Head, transferred in from Pile Materials, July 1; G. R. Parkos, Engineer II, and R. L. Miller, Technician Trainee, transferred in from Education & Training, July 15 and July 6, respectively. J. A. Berberet, Unit Head, transferred to Physics Research, July 1; J. H. Rector, Engineer II, transferred to Metallurgy Research, July 1. D. E. Amos, Engineer I, was transferred from weekly to monthly, July 1.

Pile Materials: J. F. Hokenson, Engineer II, transferred in from Education & Training, July 1; P. A. Wiser, Stenographer, transferred in from Office Auxiliaries, July 16. A. G. Blasewitz, Senior Engineer, transferred to Pile Engineering, July 1; R. E. Falkoski, Engineer II, transferred to Metallurgy Research, July 1. W. F. Hall, Junior Engineer, was transferred from weekly to monthly, July 16.

Fuel Technology: F. H. Lofftus, Engineer II, was hired July 17. B. C. Deardorff, D. J. Hebard and D. A. Yetter, Technician Trainees, transferred in from Education & Training, July 25; C. J. Denton and S. D. Deusser, Engineering Assistants, transferred in July 30 from Manufacturing-Separations and Manufacturing-Metals Preparation, respectively; G. K. Campbell, Secretary B, transferred in from Design Section, July 30. W. C. Budke, Engineering Assistant, transferred to Metallurgy Research, July 30; S. Harty, Secretary B, transferred to Physics Research, July 30. M. R. Tupper, Engineer II, terminated July 13; R. Van de Mark and W. C. Ward, Engineering Assistants, terminated July 27 and July 10, respectively; L. V. McDaniel, Stenographer, terminated July 20.

Physics Research: J. A. Berberet, Senior Engineer, transferred in from Pile Engineering, July 1; S. Harty, Engineering Assistant, transferred in from Fuel Technology July 30. M. Brown, Field Clerk C, was deactivated July 26. J. D. Feichtner, Engineer I, was transferred from weekly to monthly, July 1.

Pile Technology Section

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Metallurgy Research: H. W. Newkirk and W. L. Wyman, Engineer I's, were hired July 2; G. A. Conner, Senior Engineer, was hired July 16. J. H. Rector and R. E. Falkoski, Engineer II's, transferred in July 2 from Pile Engineering and Pile Materials, respectively; W. S. Hartnett, Engineer II, transferred in from Manufacturing-Separations, July 16; W. C. Budke, Engineering Assistant, transferred in from Fuel Technology, July 30; S. R. Von Krosigk, Technician Trainee, transferred in from Education & Training, July 16. W. R. Smith, Unit Head, terminated July 13.

PILE ENGINEERING SUB-SECTION

PROCESS TECHNOLOGY

Power Level Limitations

Maximum power levels at the B Reactor have been limited by trip-before-instability limits near 103°C. The C Reactor has been limited by the 98°C tube outlet limit and the DR and F Reactors by the 100°C arbitrary limit. The D and H Reactors have been limited by the 105°C tube outlet limit and the K Reactors by tube power limits.

Process Specification Changes

Specification 11.00 - "Allowable Heat Generation in a Process Tube" - New, higher instability limits were authorized by revision of this specification.

Specification 16.00 - "Water Supply During Shutdown Periods" - Principal changes made in the specification were:

- (1) Reduction of the bulk outlet temperature limit at the K Reactors to 90°C based on the calculated V-73 valve opening transient.
- (2) Establishment of a 110°C tube outlet limit at the K Reactors based on the V-73 transient.
- (3) Throttling of front crossheaders before opening of the rear riser drain was required at the K Reactors.
- (4) Several changes were made in the requirements for the K Reactor high pressure cross-tie and associated valves.
- (5) New specifications were added covering action to be taken in case of K Reactor emergency generator trouble.

Specification 22.00 - "Charging and Discharging Process Tubes" - The requirement that "charge-discharge" during operation cannot be performed unless the automatic elevator interlock is in operation has been deleted. The design of the revised poison column control machine is considered to provide adequate protection from damage of front face piping by the machine. Also, based on the incident of pigtail loss at the C Pile, the consequences of damage would probably be considerably less serious than previously supposed. The requirement that the front elevator interlock be in service by June 1, 1956, was deleted. Procurement difficulties have made compliance with this date impossible. Elevator interlocks are now required to be in service as soon as the necessary equipment has been installed and tested.

Specification 55.00 - "Rate of Control Rod Withdrawal During Startup" - The initial number of inhours of subcriticality for cold startups was increased from 80 to 100. The initial number of inhours of supercriticality for hot startups was decreased from 80 to 60. The subsequent withdrawal rate was increased slightly. Provision was made for considerably faster withdrawal rates as soon as more accurate rod calibrations have been made and approved (the actual rate will be no faster because present calibrations at the old reactors undervalue horizontal rod strength). Calibrations at the K Reactors are accurate and use of the faster withdrawal rate can begin at once.

Specification 56.00 - "Process Radiation Monitoring Instruments" - Requirements for Beckman trip settings during normal operation were revised. The action to be taken when indications are below normal was made less restrictive. Based on higher tube

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instability temperatures, the margins between indication and trip, as a function of maximum tube temperature, were put on a 10 C higher schedule.

The requirement for a period trip at the K Reactors was changed to permit hot start-ups without the device when it is out of order.

With the exception of one aspect of the Beckman low trips, the K Reactor flux trip system now complies with Specification 56.01. Specification 56.03, which included several allowances for a sub-standard system, was deleted with the exception of statements permitting Beckman low trips to be bypassed while shutting down and during hot startups.

Specification 57.00 - "Power Level Measurement" - The requirement that the No. 1 indicating scale of the galvanometer show variations of ten megawatts or less in power level at normal operating power has been eliminated. Difficulty in meeting this requirement has been experienced as power levels have been increased. A high sensitivity of the No. 1 scale when at high power levels is desirable, but not essential because the information that would be provided is the same as is provided by the Beckmans. Good startup sensitivity is needed, and continues to be specified. The requirements for high sensitivity of the No. 2 scale have not been changed.

File Operation

The following numbers of tubes were removed and replaced under the routine tube replacement program: D-55, F-195, H-53. In addition four tubes at C, two tubes at D, four tubes at DR, two tubes at F and two tubes at H were removed for examination by the File Coolant Studies Unit. These were all replaced plus four tubes at D, 17 tubes at F and 19 tubes at H in channels which had been left empty from previous outages. There were 17 tube leaks, four rear Van Stone leaks and one front Van Stone leak during the month compared to eight tube leaks and four rear Van Stone leaks last month. One tube leak and the front Van Stone leak were at the D Reactor. Three tube leaks and two rear Van Stone leaks occurred at the F Reactor. The remaining leaks occurred at the H Reactor. Three of the leaking tubes were removed, the rest were blanked off and left as air tubes.

Some 50 stuck charges of 3/8 inch cored slugs have cost approximately 60 hours of operating time at the B, D, and F Reactors. It has been shown that warp and internal splitting are complementary forms of dimensional change which combine in this type of slug to produce greater than tolerable distortion. Discharge of cored slugs at reduced goal exposure has been recommended and delivery of 3/8 inch cored slugs to Hanford has been discontinued. One-half inch cored slugs will be charged in test quantities starting about September.

Ruptured Slugs

The month's rupture experience was characterized by:

- (1) A very favorable experience at the old areas - one failure at D.
- (2) Two high exposure ruptures at C Area, from putting the fringe on intermediate high goal. This trend can be expected to continue as large amounts of metal approach goal exposure. The data from irradiation of the fringe tubes and the first charges of central zone tubes on reduced high goal will be used to plan power cuts which may be necessary as a result of the increase in goal exposure at C Area.

RUPTURED SLUG TABULATION

<u>Failure Date</u>	<u>Tube No.</u>	<u>Lot No.</u>	<u>Type Metal</u>	<u>Exposure</u>	<u>Type Failure</u>
6/28/56	2046-KW	K-185	8" Regular	872	Split
7/7/56	1176-D	N.A.	8" Cored	571	N.A.
7/15/56	3792-C	M-134	8" Regular	387	Side - H.S.
7/19/56	2494-C	V-32	8" Regular	407	Side - H.S.
7/19/56	2482-KW	M-90	8" Regular	729	Split
7/24/56	1790-KE	M-111	8" Regular	685	N.A.

"C" METAL RUPTURES

7/20/56	0475-C	10	"C" Metal	47/tube	N.A.
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Legend:

- N.A. - Information not available.
- Side - H.S. - Failure caused by a hot spot.
- Side - R.R. - Failure caused by reduced rib height in the tube.
- Side - Other - Failure probably caused by some mechanism other than R.R. or H.S. such as pin hole penetration or other unknown mechanism.
- Cap - Failure caused by loss of cap.
- Split - Split or fracture parallel to or at an angle to the axis.
- Unclassified - Failure type does not fit into any of the above categories.

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CEL

PRODUCTION TESTS

Test No.	Type Metal	No. of Tubes	Pile	Goal Exposure	Present Exposure	Remarks
105-586-A	U-S1 Ingots	1	B	900	Dis. at 1007 MWD/T	Not yet charged
	U-S1 Ingots	4		2 ruptures		Not yet charged
	U-S1 Cored	3		900		Not yet charged
	Control	4		2 ruptures		
105-588-A	Development Test of Extruded and Drilled Cored Slugs	2 tubes per mo.	1-C 3-C 3-D	900 1100 900	Discharged at 900	Dis. 1 rupture at 797 MWD/AT Dis. at 750 MWD/T 1 ruptured at 772 MWD/T 1 discharged at 788 1 discharged at 807
			5-D 3-D 12-D	900 900 900	Discharged at 900 All tubes discharged 675-775 MWD/T due to stuck charge difficulty	Dis. for tube replacement Charged 9/28/55. One dis. at 259 for tube replacement. One ruptured at 648. Irradiation Complete
105-590-A	Extruded Cored	4	C	Ruptures	Not yet charged	Compares performance of extruded and drilled cored slugs.
105-591-A	Cored		All but C	800		Authorizes irradiation of production quantities of cored slugs.
105-597-A	Mg-U Matrix 4 slugs	1 1	B or D 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.
105-608-A-56-MT	Dingot Slugs	16	B	7-600 9-900	815-900	Seven tubes discharged at 600 goal. Compares various mechanical and heat treatments of dingot U.
105-608-A-56-MT Supplement	Dingot Slugs Controls	4 4	C C	Ruptures Ruptures	Not yet loaded	Compares performance of dingot and ingot uranium slugs.

105-610-A- 60-MT	Vertically Heat Treated Uranium	10	DR	5-600 5-900	600 600-620	Rod heat treated in vertical position.
105-611-A	Regular Production	33	19B	500,900,1100	680-810	Eight discharged at 500 goal Investigated the effects of pile variables upon slug stability. Five discharged at 500 goal. Two discharged at 800 goal.
105-613-A- 54-MT	Solid	19	KW	3-400 8-600 8-900	140	Delays 35, 50 and 80 seconds between salt bath transformation and water quench. Heat treated in rod form.
105-615-A- 63-MT	Lead Dip Canned I & E	8	C	150,300,500 and 2 ruptures	about 400	Provides basic information on I & E performance and conversion ratio. Four tubes on each type loaded 3/14/56. One I & E charge discharged and replaced at about 50 MWD/T. Four additional charges of each type loaded 5/17/56. All goal exposure charges discharged.
	Control	8	C	150,300,500	about 390	
105-620-A- 65-MT	Tru-line		C	Normal Goal	Not yet started	Provides for the quantity charging of Tru-line slugs.
105-621-A- 67-MT	Anodized	12	10-D	600,800,MWD/T	300	To determine corrosion resistance and provides for the eventual charging of anodized slugs in quantity.
DT 105-623-A	Regular		DR	Normal goal		Provides for the hand seating of charges loaded on alternate outages. Investigates effect upon failure rates.

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HEAT TRANSFER

Transient Instability Tests

Analysis of recently acquired transient instability data has continued. To date, most of the data contained on strip charts has been abridged and transferred to tabulated and unitized flows, temperatures, pressures, etc. Further analysis will continue.

Full Scale Mock-Up

The facility has been shut down during the month to permit modification and additions to be made which will add greater general testing flexibility and also to permit the testing of an I & E geometry.

Organic Coolants

A preliminary review of the feasibility of determining heat transfer characteristics of organic coolants in the low pressure loop resulted in the conclusion that such experiments are not feasible pending answers to certain questions. These questions include the possible hazardous effects of arc discharge taking place in the presence of the fluid, the effects and probability of leakage at joints and fittings in the loop, and the effects of the coolant on various loop auxiliaries such as pumps and condensers. Pending answers to these questions, it is believed that considerable knowledge about the problems of handling this material and about the actual heat transfer characteristics of it may be gained at less risk in a small scale experimental facility. Such a test facility is presently being designed.

High Pressure Boiling Studies

Attempts to continue the program of boiling burnout tests were terminated early in the month when a new heater rod developed a leaky connection. An attempt to make a quick repair of the leak was unsuccessful. The only other heater rod was in the shop for repair. An enforced shutdown for the remainder of the month has been utilized in making alterations and additions to the facility. Of principal importance is the installation of a new process tube of improved design.

A preliminary feasibility and cost study on the installation of a vertical test section was completed by the Project Section the first of the month. The installation of the new section in the 185-D Building just adjacent to the present facility appears quite feasible mechanically and cost is estimated to be about \$57,000.

Two-Phase Critical Flow Studies

A literature study of the problem has been completed. Consideration is now being given to the experimental work and the design of facilities needed to complete information necessary for solution of anticipated future problems.

Hydraulics Studies

Flow characteristics were determined for CG-482 pigtails used at the rear of an H Pile tube mockup. The results verified those earlier reported by H. H. Greenfield.

Calculations based on these results indicate that a flow increase of approximately two per cent can be obtained after CG-558 by replacing the present H Pile rear pigtails with the CG-482 design.

A column of 18 solid slugs supported by 1/4 inch diameter projections were tested in a BDF size ribless process tube. The flow characteristics of the charge appear to be substantially identical with those of present slugs in a normal ribbed tube.

I & E Slugs

A mixed charge of eight regular solid slugs downstream of 24 C Pile I & E slugs was tested in a regular C Pile process tube. The two types of slugs were separated by a short -- 1-1/2 inch -- transition piece made from a regular perforated dummy. The piece contained two rows of perforations. No unusual phenomena were noted and the flow characteristics indicated approximately a four per cent full pile flow increase assuming a pump characteristic curve and no other limit on total water flow. On the same basis a full I & E loading would give a seven per cent flow increase. Mixed loadings appear to have certain advantages over full loadings of either solid or I & E slugs.

Calculations were made of the allowable charge length and outlet temperature limits for a planned production test of enriched I & E slugs at C Pile. The charge will probably consist of 16 or 17 slugs per tube. Four C Pile venturis were reamed to a 0.404 inch throat diameter and calibrated in the Hydraulics Laboratory for this test.

Analytical Services

Some assistance was given to the Process Sub-Section in determining the effectiveness of damping devices on CG-558 Panellit gauges to reduce gauge fluctuations. The devices seemed to warrant further development.

Additional help was given in the preliminary design of four proposals for a plutonium cycle demonstration reactor. The calculations related largely to fuel element design and coolant requirements.

Completed and issued Document HW-44485, "Optimizing the Variable Goal Curves". This report presents formulae for determining exposures of tubes of various powers in order to minimize rupture rates and keep a given metal throughout. The analysis was based upon current rupture data collected and correlated by J. W. Sowards.

A formula was derived for computing the temperature effects of different heat transfer coefficients on the top and bottom of a slug.

Service calculations for other units included the evaluation of temperatures in a proposed MTR experiment and in a completed MTR experiment and an evaluation of the temperature distribution in a slug containing internal cooling holes spaced on some central radius.

Concerning the special reactor hazards report post CG-558, the heat transfer sections of this report have been completed to rough draft form.

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The original electrical analog computations of central graphite temperature distributions for KW showed close agreement with measured filler block and tube block temperatures but poor agreement with bore temperatures calculated from measured temperatures. A recent analog study of the problem using a slightly revised grid, a value of five per cent instead of six per cent heat generation in the graphite, and a revised value of tube block thermal conductivity showed reasonably close agreement with measured tube and filler block temperatures and calculated bore temperatures. Changes in graphite thermal conductivity of ± 25 per cent showed only minor changes in analog temperatures. From this information it is concluded that the accepted value of six per cent heat generation may be too high.

Equilibrium or maximum charge temperatures after water shut off to single tubes or single or double rows of tubes in a shutdown pile were determined using the analog. The following temperature ratios were obtained using identical tube power levels:

Water Shut Off B,D,F Piles	Temperature Elevation of Slugs Relative to Temperature Elevation in Single Tube Case	
	<u>Tube Water Filled</u>	<u>Tube Drained</u>
Single Tube	1.0	1.0
Single Row	Approximately 1.2	Approximately 1.05
Double Row	Approximately 1.6	Approximately 1.20

A considerable scatter in the results was obtained depending on the pile simulated, the temperature reached, and whether the tube was drained or filled.

A review of the pile water export system is in progress. Its effective volume with respect to the various piles has been determined and pile flow rates under various conditions are being calculated.

Thermal Studies

Heat transfer coefficients to liquid water under forced convection conditions were calculated using data from the high pressure apparatus. The experimental coefficients did not agree satisfactorily at high Reynold's numbers with coefficients predicted using the Seider and Tate correlation. There are several possible reasons for the discrepancy and it is planned to repeat the test in the near future to determine the cause of the discrepancy.

Calculations based on information found in a literature survey lead to the prediction that for a standard HAPC process tube, bulk boiling would occur before sub-cooled burnout in cases of reduced coolant flow or increased tube power. However, sub-cooled burnout could conceivably occur where a slug or group of slugs were badly misaligned.

PILE PHYSICS

K Reactor Cycling Observations - PT 105-630-A

An experimental control configuration utilizing upstream and downstream rods to avoid front to rear graphite temperature cycling has been achieved at the KW reactor under PT 105-630-A. Shift coverage was provided in arriving at this planned configuration following the rupture outage of 7/21/56, then normal operation was

resumed using this configuration to demonstrate its relative stability. It is hoped that the less-flattened longitudinal flux distribution plus the associated reduction in front to rear graphite temperatures will reduce the operational problem from three dimensions to two. Experience prior to the scram of 7/27/56 indicated that graphite temperature would be more stable under the test configuration. An interesting observation is that the front-to-rear graphite temperature profile is quite flat, indicating the existing graphite coring pattern to be almost ideal when the new rod configuration is in use.

Several days of equilibrium operation plus recovery experience from purposely initiated distortions will be required before it can be concluded whether or not this approach is to be successful.

HCR Calibrations - PT 105-605-A

Critical predictions following over 70 B, D, and F File outages were calculated on the basis of the new DR calibration results and associated coefficient adjustments. Results indicate that prediction errors using the corrected method average slightly less than previously. In addition, the more consistent new values should result in still greater error reduction in extreme reactivity cases where large extrapolations are required.

A study comparing the recent DR calibrations with earlier data has been summarized in rough draft form. Conclusions of the study are that the latest calibration data can be reconciled with initial startup data but not with operating xenon transient data.

The effective reactivity absorbed by xenon in a pile under transient conditions is no doubt strongly shadowed by rods. Thus the correct calibration for use in a cold startup would not necessarily apply to non-equilibrium operating conditions.

PT 105-635-A authorizing calibration of the H Pile rods has been issued. This test will probably not be run before September because of reactor schedules.

Reactivity Accounting

HW-43510, "Reactivity Accounting by Machine Computation", was issued. It is recommended that this method be tried on a somewhat infrequent schedule for a year's time to permit assessment of benefits. Suggestions are made also for defining flattening efficiency in a more precise fashion.

Nuclear Safety Studies

Assignments made to various individuals for contributions to the Post CG-558 - CG-600 hazards report have been largely completed. Sections on water-loss excursions, operational physics, and control capacity have been submitted by members of the unit. An introductory descriptive chapter on the plant layout and buildings has been completed in rough draft form, and a chapter describing the nuclear process has been started. Work can now proceed on coordinating the technical contributions by a single author.

Routine nuclear safety audits were carried out at the Lattice Test Reactor, and observations were discussed with the Experimental Reactors Unit. The thermal Test

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Reactor startup procedure was reviewed; with the exception of a particular loading procedure which is now being revised, the nuclear safety aspects of the TTR start-up program appeared acceptable.

Fringe Poisoning for Shield Protection

The new fringe poison load for the H File consisting of mint pieces centered with natural uranium is to be charged at the next outage. A rough draft for a fringe poison test using "E" metal for support in enrichment has been written, and provisions are being made for obtaining a shield temperature traverse in an adjacent test hole.

Shield Neutron Dosimetry

The paraffin moderated dosimeter has been calibrated for 25 Kev neutrons with an antimony-beryllium source. Results indicate that the dosimeter reading is conservative by a factor of three in this energy range whereas it shows fairly accurate dose response for thermal neutrons and for intermediate and fast neutrons above 100 Kev. Simple laboratory measurements are planned to simulate the scattering caused by the paraffin cave secondary shielding which would surround the counter atop the DR test wells.

Shield Spectrum Studies

Several U-235 foils have been placed in one of the DR test wells to check the energy spectrum and decay characteristics of the fission products. Fabrication of U-238 foils has been completed, and fabrication of the Pu-239 foil has recently been started.

An appropriation request has been prepared justifying the purchase of an already built Argonne proton recoil spectrometer plus associated electronic components. Trip report HW-44268 discusses this equipment in more detail.

An analytical study to determine to a rough approximation the neutron spectrum characteristics through iron has been completed. Intermediate neutron leakage through a shield consisting of iron only would be quite high even through the 25 Kev cross-section dip were not there. An informal report will be issued shortly showing the assumptions and methods used in this study.

PHYSICS DEVELOPMENT

Rupture Detection Development

A prototype model of the "Gammascan" slug rupture detection system was installed at C File. This system consists of forty-six gamma detectors (the geiger-muller tube type) placed in collimating shields and distributed at process tube intervals across the rear elevator; the signals are rapidly scanned electronically to provide a horizontal traverse and elevator placement provides a vertical traverse. The system is designed to remotely and semi-automatically isolate and locate sources of radiation on the rear face, such as misplaced slugs, and to determine the tube containing a rupture following identification of the cross-header by the primary gamma spectrometer rupture detection units and following the ensuing reactor shut-down. The prototype system rapidly located the rupture containing tube for the

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three ruptures occurring at C Pile since the installation. The electronic components have performed as designed.

The use of the gammascan system to locate rupture containing tubes during reactor operation, as would be desired in support of charge-discharge during operation for example, does not appear promising without further development and system redesign. The high gamma backgrounds during operation (20 roentgens per hour) place a high lower limit on the magnitude of rupture signal required for detection by a non-energy discriminating detector; it would appear that not over fifty per cent of the ruptures could be quickly isolated during operation by the gammascan system in its present form which is as expected. The development of energy discriminating systems to improve the detection sensitivity in the presence of high background levels has begun.

Two improved portable instruments to assist in the isolation of tubes containing ruptures were provided Operations. The first "Bazooka II" consists of a small gamma detector in a collimating shield, contains miniaturized electronics and spans the range from 38 mr/hr to 155 R/hr. The second is a portable probe, the "Pogostick", and relies upon close contact, i.e., inverse square law, for background to signal sensitivity rather than shielding and collimation; it spans the range from 10 mr/hr to 20 R/hr.

Reactor Instrumentation - Nuclear Safety

The prototype sub-critical neutron multiplication detector was installed in the A test hole at D Pile. The sub-critical pile neutron flux level was very satisfactorily monitored through the long outage and the sub-critical reactivity status the reactor satisfactorily indicated during all phases of the startup. The results are essentially identical with those from previous prototypes and again show no justification for delaying project action to install sub-critical monitors at all piles.

The initial model of a high temperature, high flux ionization chamber to operate in fringe process tubes to provide octant monitoring at B, D, and F Piles is now complete and installed at F Pile. The need for further development or refinement will be determined during operating tests next.

Nuclear Safety

The analyses of the results from the measurements of the rate of water boilout from a process tube in event of instantaneous loss of pressure are continuing; the measurements were made in the Heat Transfer electrical mockup. The evaluations are proving difficult to apply directly to a production pile because no attempt to rigorously reproduce production pile hydraulics was made in the mockup experiments and the differences may be important; these will be evaluated as part of a comprehensive series of boilout tests to be performed in September extending the cases initially studied.

The tentative results from the initial series of tests are as follows:

Test No.	Time (Sec.) from Panellit Trip for Various Amounts of Water to be Removed			Delay Time (Sec.) Between Pressure Loss and Panellit Trip	Power (KW)
	25 %	50 %	75 %		
1	0.28	0.62	1.01	0.45	725
2	0.32	0.68	1.00	0.40	725
3	0.44	0.85	1.24	0.30	725
4	0.34	0.76	1.17	0.40	725
5	-0.13	0.15	0.37	----	1000

Lattice Neutron Economy

Seventy-two aluminum jacketed 0.5 inch O.D. uranium rods are now available for the study of cluster element fueled lattices in the Physics Constants Testing Reactor; these materials permit the mockup of up to eight rod cluster assemblies.

Measurements of the fast effect as a function of several rod densities in a cluster were completed in a water moderated tube assembly irradiated in the Hanford Test Pile to yield the following:

<u>No. of Rods</u>	<u>δ</u>	<u>Σ</u>
1	0.0173	1.0085
5	0.0285	1.014
6	0.351	1.017

where δ = ratio of fast to thermal fissions

$$\Sigma = \text{fast effect} = 1 + 0.49 \delta$$

The initial irradiation of massive uranium slugs was completed in the PCTR to yield the lattice constants (thermal utilization, resonance escape probability, fast effect, and conversion ratio) for this loading which is of interest in advanced reactor programs. The fuel element was solid, 1.68 inches uranium O.D., canned in aluminum and the lattice was 7.5 inches with a 0.120 inch light water cooling annulus; these data are now being analyzed. The uranium and aluminum jackets for massive elements 1.93 inches O.D. are being fabricated in preparation for lattice experiments on this still larger size fuel.

The initial cold, clean conversion ratio measurements in the E-N load were made in the PCTR. The E to N configuration consisted of five six-inch E slugs (0.94 weight per cent U-235) and one 3.3 inch N slug (3.5 per cent lithium in aluminum); this configuration has been shown to essentially match natural uranium reactivity through Hanford Test Pile measurements. When allowance is made for long term reactivity changes the measured conversion ratio becomes 0.168 for tritium and 0.67 for plutonium to yield a total atomwise conversion efficiency for the E-N load to be 0.838 which is in excellent agreement with calculations upon which the E-N concept was based.

Measurements performed to date to determine the lattice constants for internally-externally cooled slugs - for use in present piles - have been analyzed to yield the following experimental cold, clean lattice data;

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	<u>P</u>	<u>f</u>	<u>Σ</u>	<u>K_∞*</u>	<u>C.R.**</u>
Solid (1.336" O.D.)	0.867	0.87	1.032	1.0326	0.837
I & E (1.37" O.D. - 0.479" I.D.)	0.866	0.87	1.0265	1.0260	0.836

* K_{∞} assumes $\eta = 1.325$

** C.R. = conversion ratio-atoms Pu formed per atom of U-235 depleted.

Hence, the reactivity loss associated with the use of I & E fuel elements is through the decrease in fast multiplication; the conversion ratio loss appears very small although the I & E element contains about seven per cent less uranium.

Assemblies have been designed for use in measuring doppler coefficients in uranium and uranium oxide systems at very high temperatures, i.e., up to 1000 C. These measurements extend lower temperature measurement previously completed and are important in nuclear safety analyses and in the evaluation of doppler coefficient theory.

Test Pile - Routine Tests

Regular uranium slug testing proceeded routinely. Eleven Fernald billet egg lots yielded TDS values ranging from 16 to 19. Six Mallinckrodt egg lots yielded TDS values ranging from 14 to 18.

MECHANICAL EQUIPMENT DEVELOPMENT

Reactor Safety

Evaluation of the effect of BF_3 on graphite blocks has been delayed due to lack of operating personnel at the 305 Pile.

New Process Methods and Prototype Equipment

Design Test No. 62 - Air Filter Test - Equipment design is in progress.

High Pressure - High Temperature Loop - The one inch stainless KER header test section (Test No. 1706-KER-4) has undergone approximately one-third of the requested heat cycles, and appears to have a satisfactory leakage rate.

Sliding Rear Gunbarrel Attachment - Process tube Van Stone failures, particularly at F Pile, have increased significantly in the past few months. Analysis of the failure mechanism indicates that the stress induced in the flange as a result of thermal expansion of the process tube together with sticking tubes and gunbarrels is the cause for failure. To prevent such failures a new type of gunbarrel flange has been fabricated that will prevent stresses being built up in the tube Van Stone flange. Laboratory testing of the fitting is awaiting modification of the cycling machine.

Design Test No. 60 - Air Accelerated VSR - An interim report is being written to cover the first part of this test. Initial tests showed that the assembly gives satisfactory holding forces and release times. Further tests will be made upon receipt of an eight inch tube which has been ordered by Design Section.

A magnet actuated switch has been installed on a "K" VSR cylinder to indicate when the piston is in the full up position. The assembly was tested through two thousand, four hundred operations without experiencing a failure. This indicator is being called to the attention of Manufacturing Engineering.

Sub-Critical Monitor Mark III - The monitor was installed in the "A" test hole at D Pile, and it performed satisfactorily during startup. Minor adjustments are to be made to the chamber position in the shielding train.

Design Test No. 58 - Barco Swivel Joint Connector - Two prototype Barco joint connectors are undergoing tests to determine cycle life, leakage rates, and other pertinent properties.

Poison Spline - Feasibility tests using a thin neutron absorbing spline under the active charge in a reactor tube were completed and reported in HW-43926.

Plans are being made to locate about 50 spline sealing nozzle caps on the front face of a BDF reactor. If a tube near one of these caps limits power levels because of high outlet water temperature, a spline can be inserted to cut power in that region.

Design Test No. 61 - Vee-Band Connection for Nozzle - Fatigue tests of the 37° flare tubing connection in the vee-band nozzle have shown it to be inferior to the Van Stone flange in present use. The joint fails by extrusion of the flare. The vee-band nozzle being tested has been modified to allow testing with a Van Stone joint instead of the flare.

Fuel Elements and Slug Handling

Ribbed Slugs - Additional ribbed slugs were received using 63S aluminum and 2S aluminum as rail materials. After two regular length columns were charged through a new ribless tube, considerable damage was evident on both the tube wall and the slug rails. The tube was deeply grooved, with no preference shown the top or bottom half. The 63S rail material appears superior to 2S.

Slug Cocking Experiments - Continued tests on Tru-line slugs have shown that cocking can occur under normal charging conditions. These tests also showed that once the Tru-line slug cocked, it remained cocked under conditions to which a slug is normally subjected, indicating that the Tru-line feature of these slugs is inadequate.

Twelve charges of .001 inch coated anodized slugs were pushed through a new BDF tube under normal charging conditions, and were compared with regular metal slugs pushed through the same tube. In general, the anodized slugs appeared to be in the best condition after being pushed through the tube. This work was conducted in cooperation with the Coating and Corrosion Unit of the Fuel Technology Sub-Section.

The flow mockup in the 189-D Building was revised to simulated CG-558 conditions and several regular charges were pushed through the tube using standard charging procedures. Points of significance which were observed during these tests were: (1) that misaligned nozzles (nozzle too low) invariably resulted in cocked slugs in the tube; (2) that, at 40 gpm, the first and second slug in the column could be made to float to the top of the tube. This occurred only in a tube distorted to central D Pile conditions.

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The possibility of charging oversized I & E slugs into regular nozzles was investigated. C Pile I & E slugs (1.474 nominal O.D.) were charged into a CG-558 nozzle to check for wear on the slugs and interference during charging. As long as the nozzle was aligned properly, the slug could be charged. Since BDF Pile I & E slugs are designed to have a nominal O.D. of 1.460 inch, 20 mils larger than regular slugs, no justification for increasing the I.D. of CG-558 nozzles could be found. However, it was determined that good nozzle alignment must be obtained during installation and this alignment must be maintained after installation.

A production test, PT 105-634-A, which will authorize cocked slugs to be placed in 24 C Pile process tubes is being circulated for approvals. The purpose of this test is to determine whether or not cocked slugs in process tubes are a serious problem.

Automatic Slug Sorting in Basin - Drawings SP-7967 and SP-7968 have been issued as check prints. They show the general layout and operating concept of the conveyor system and bucket loading device. Design of the drive mechanism is in progress.

Equipment and Techniques for Dealing with Special Maintenance Problems

Helium Leak Test Equipment - Eighteen tube leaks were found at H on the first test using the steam jet eductor. Some of these leaks were caused by tube pressurization, rather than by usual corrosion-attrition.

Approved drawings for B, D, F and H have been issued.

Rubber Boots for Gunbarrel Bellows Repair - A mockup test of the leakage rate of helium from a bellows without an O-ring seal in the flange indicates that the bad leaks at 105-H are around the gunbarrel, rather than from the gunbarrel centering flange. The split boot will repair this type of leak. A silicone grease is being investigated as an agent to reseal the O-ring flange leaks.

SPECIAL IRRADIATIONS

KAPL-120 Loop

The loop was started up on July 7 following a shutdown which began on May 29. The following jobs were completed during this shutdown.

1. The hot crud filters were completed with the exception of the shielding, lagging, and sample pots.
2. The hydroclone was completed with the exception of lagging and thermocouples.
3. The depletion ion column has been installed and is operating.
4. The bomb sample points have been changed, however, valve leakage has prevented their use. Repair as soon as possible.
5. Equipment for sampling surge top and bottom was completed and is operating.
6. The control valve was calibrated.
7. Lead valves on ΔP gages were installed.
8. The make-up pumps were repaired and returned to service.
9. The process water valves were repaired.

10. The containers for transporting the crud samples to 300 Labs are being fabricated.
11. A shipping cask for the reference loop corrosion assembly is being fabricated.
12. The concrete base for the motor generator set was completed and the unit is back in operation.
13. The system was pressure tested at 3750 psi and all leaks repaired.
14. The material for run No. 4 was charged (WAPD A, B, C, & D; KAPL CH-5 and STS-2 in-pile, KAPL CH-6 in reference loop).
15. Sampling procedures and special tests have been formulated and are in progress.
16. Replacement G.E. wattmeters have arrived and will be installed.

The pile is scheduled down for a two-week outage on 7/29/56. The crud cells and hydroclone will be completed and shielding will be added as required.

In-Pile Irradiations

Official notification was received by AEC-HOO of approval to proceed with design of the recirculating gas loop for the Army Reactors Branch. Representatives of HAPO attended a meeting in Washington, D.C. on July 16 at which the design basis was firmed up. Minor revisions in specifications aimed at simplifying the design and reducing costs were made.

Representatives of Battelle Memorial Institute, which organization will utilize the loop if constructed, also attended the meeting. Two major technical problems were brought up:

1. The applicability of test results obtained at a loop operating pressure of 100 psi to the Army reactor design with an operating pressure of 200 psi. HAPO will revise the operating pressure upward as much as allowed by a relaxation in maintenance of gas temperature during outages, and BMI will investigate the effects of a lower pressure on test validity. It is hoped that a pressure acceptable to all can thus be attained.
2. Nitriding of the in-pile tube. The presence of metallic hydride moderator samples in the loop is anticipated to cause hydrogen partial pressures as high as one atmosphere. Interaction with nitrogen under the influence of radiation may produce enough nascent nitrogen to cause serious nitriding of the in-pile tube. BMI will proceed with tests on inconel X to determine its resistance to nitriding under simulated conditions. In the meantime, HAPO design will continue to use inconel X as the in-pile tube material. If inconel X is not acceptable nichrome V may be satisfactory.

A trip report embodying more details will be issued shortly.

A study of production rates, specific activities, and costs (including plutonium losses and enrichment requirements) for megacurie quantities of cobalt-60, requested by AEC-HOO, was completed during the month. It was recommended that production by substitution of cobalt for presently considered poison in the fringe protection program be used, with this supplemented as needed by production in an "E-Co" loading similar to the 0.94 per cent enriched uranium-mint loading. The former method would

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yield about 2 megacuries per year, the latter slightly over 9000 curies per tube-year, at prices of \$0.36 and \$0.48 per curie, respectively. Plutonium production losses were estimated at about 7 Kg per year and 80 grams per tube year, respectively.

Substitution of cobalt for present flattening poison was not recommended due to marginal specific activity and an unpredictable future.

A summary report (HW-44320) has been issued on the study; a detailed report (HW-44321) will be issued shortly.

In connection with the study, 305 Test Pile runs were made on a prototype cobalt slug. It was determined that for a loading of 48 grams of cobalt/inch, the ratio of volume average thermal flux in the cobalt to that in adjacent uranium, unperturbed, was 0.43. The ratios for individual cobalt strips (twelve total) to piece average ranged from 0.61 to 1.6. The reactivity effect per unit length was found to be 93 per cent that of mint.

The four run to rupture I & E tubes with temperature probes (HAPO-159) continued irradiation through the month. Two out of sixteen thermocouples have failed to date. Twenty-four C Pile probes, 16 B Pile probes, and 16 K Pile probes are being fabricated for future I & E slug testing.

Assembly No. 3 of the NAA safety fuse series (HAPO-162) is being held on site pending possible 305 Test Pile investigations. The design is being revised for an assembly for the third authorized irradiation. A delay of at least fourteen weeks will result before this assembly is complete. The major design change is substitution of copper for stainless steel as the heater resistance pad.

Two experimental assemblies for studying the in-pile reaction between zirconium and pile gas impurities (HAPO-105) continue to operate at F Pile. These assemblies were charged during September, 1955. As soon as braided AC shielding has been obtained for the ex-pile leads, two new assemblies will be ready to charge as replacements for the above assemblies.

The four temperature probes for measuring annular water temperatures for normal slugs (HAPO-178) continue to operate. Considerable differences between individual thermocouples exist (as much as 24 C). Individual thermocouple readings are consistent within themselves. Several factors -- cocked slugs, worn ribs, uneven radial heat distribution around each tube, and others -- all probably combine to produce the differences.

Annulus tube components are being fabricated for an experiment to irradiate graphite at intermediate, controlled temperatures (HAPO-124). Difficulties with the experimental assembly will delay charging until September or October.

Preparation work for front to rear test hole fuel element irradiations (HAPO-174) that require elevator time and that can be accomplished prior to charging the experiment are complete. Otherwise, there has been no change in status. The customer is preparing a production test draft.

Pre-post experiments were charged and/or discharged during July as follows:

1. Eight isotope samples were charged into KW Pile (2-D test hole).
2. Two isotope samples were charged and three discharged from DR pile (D test hole).
3. Two sets of krypton gas samples (HAPO-166) were irradiated in DR Pile. These irradiations are in support of rare gas diffusion rate studies for uranium.
4. One set of effluent water residue samples (HAPO-172) was irradiated in F Pile (E test hole). These irradiations are aimed at identifying and estimating concentrations of effluent water impurities.
5. 30 cobalt bearing pieces (HAPO-167) were charged into DR Pile as part of the flattening pattern. It is anticipated that a residence time of three months or more will be achieved. These pieces will be used in the F gamma pit on discharge, and will serve to determine the exposure corresponding to the desired gamma intensity for subsequent HAPO-167 irradiations.

The production test authorizing the production of high intensity Co^{60} sources for the Product Inspection Unit has been issued. Advantage will be taken of the long residence time required to simultaneously irradiate a charge of ORNL-184 pieces (Beryllium Nitride, for C^{14} production).

The production test authorizing irradiation of cobalt gamma sources for the high intensity Hanford gamma facility has been issued. Charging will be made at the first available opportunity after fabrication of irradiation assemblies has been completed.

Gamma Studies

117 samples have been charged and 42 samples discharged from the F Area gamma pit during July. The majority of the samples were in support of plastics and rubber materials testing (HAPO-171).

A traverse of gamma intensity was made in the core tube of the waste self concentrator at the 200-E Hot Semi-works in late June. Intensity varied from 15 R/hr 14 feet from the top flange to a plateau of 10,000 R/hr at 35 feet, and then to 30,000 R/hr in the region of sludge at the tank bottom.

Facilities

The pneumatic facility at KE Pile was placed in stand-by condition during the month to minimize equipment deterioration until need for the facility arises.

The fabrication of slug holders and sample tubes for the large WADC gamma facility in the KE basin has been completed. Weasel pit revisions, where the facility will be installed, have been delayed due to a shortage of welding manpower. It is anticipated that the installation will be completed in the near future. The gamma rate meter purchased for this facility has been received and is now undergoing a check calibration.

The difficulties in operation of the heat exchangers for the K Pile heated test holes were traced to too close tolerances on the steam flow control valve stem and

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plug. The condition was corrected and the valve is now being re-installed for another trial run.

The in-pile portion of a facility for recirculation of an organic coolant (monoisopropylbiphenyl) has been designed (HAP0-182) and is now being fabricated. The facility will be installed in KE pile at the first opportunity during August. This work is being done in cooperation with the Recirculation Technology Unit and the KE-KER Semiworks Unit.

The project status for renovation of the 105-KW Special Irradiations laboratory remains unchanged pending receipt of a directive from AEC-HOO to proceed.

The D test hole magazine, F Pile, was removed at the end of June. Removal was necessary because the facility was constructed with a thimble thermally insulated (air gap) from the cooled portion, and could conceivably have achieved unsafe temperatures at post CG-558 power levels.

Borescoping and Vertical Bowing Measurements

Fabrication of a K Pile version of the mercury manometer traverse equipment is nearly complete. It is planned to conduct a trial run of the equipment in 189-D and be prepared to run traverses at the piles during August.

Vertical bowing measurements were made on a total of three tubes during July. A summary of these measurements follows:

<u>Area</u>	<u>Tube Number</u>	<u>Date</u>	<u>Remarks</u>
100-D	4453 Front	7/12/56	Down .05" at 8' since December 1, 1955 Down .07" at 10' since December 1, 1955 Down .23" at 20' since December 1, 1955
100-D	4494 Front	7/12/56	Down .06" at 8' since December 1, 1955 Down .06" at 10' since December 1, 1955 Down .21" at 20' since December 1, 1955
100-DR	4675 Front	7/20/56	No previous data

Process tube channel 2274-D was borescoped at the request of Reactor Operations on July 12 in an attempt to determine the nature of an obstruction at approximately 19 feet from the front Van Stone. A section of process tube was observed at 18 feet in the channel with large amounts of graphite chips completely blocking the tube at about 19 feet. For this reason the length of the process tube section could not be determined.

PILE MATERIALS SUB-SECTION

GRAPHITE AND MATERIALS DEVELOPMENT

Plastics and Elastomers for Radiation Fields

Additional experimental work has confirmed the original recommendation of materials for wire insulation for reactor rear face thermocouples. The fiberglass-polyethylene combination has shown itself best in fulfilling the requirements and will be installed at the various piles beginning at B this fall.

The rear face gas seals at B and D Piles were reported to be severely deteriorated and cracked. As a result of radiation testing and heat aging experiments, Hypalon A2311A-277 was recommended as a replacement material for the existing neoprene. However, closer inspection by Pile Materials personnel of the seal at B Pile revealed that the neoprene is still sound enough to act as a base for an additional coating which would seal any leaks. In order to provide the best bond, it was decided to coat the existing material with liquid neoprene thus providing an integral coating of neoprene with properties similar to the original seal. It is estimated that approximately fifteen shifts of reactor down time and maintenance personnel will be saved per reactor by using this technique instead of replacing the seal.

Infrared Spectra of Irradiated Materials

Alignment and calibration of the infrared spectrometer have been completed along with installation of dehumidifying equipment to protect the crystals. The first irradiated material which will be studied with the spectrometer is polyethylene. Changes in chemical and physical structure as a result of irradiation will be studied with both the infrared and X-ray spectrometers.

Radiation Effects on Organic Coolants

Because of an accelerated need for data on the radiation behavior of organic coolants at the projected operating temperatures of the KER organic loop facility, the planned low temperature irradiation of these materials as reported last month has been shelved. Work is proceeding along the following lines: (1) selection of a suitable capsule design for containing the materials; (2) preparation for the irradiation in the immediate future of organic samples in the front fringe zone of a pile at uncontrolled but monitored high temperatures; (3) design of a controlled high temperature facility for future irradiations of organic liquids; (4) preparation of laboratory facilities for handling irradiated capsules, determining amounts of evolved gases, and measuring physical property changes of interest.

Effect of Graphitization Temperature on Graphite Properties

Measurements were completed on the variously fired Battelle graphites made from pre-graphitized coke filler mixed with pitch binder as agreed to under the cooperative program with BMI. The contribution to final graphite properties from carbon that was initially binder material can thus be separated from the filler material contribution. The crystallite development, as would be expected considering the filler pretreatment, was constant, regardless of the final graphitizing temperature which ranged from 1400 C to 2800 C. Properties, such as thermal conductivity, which are dependent upon both internal crystallite structure and crystallite boundaries vary almost linearly with final heat treatment. A graphite temperature series with no

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previous filler heat treatment exhibits marked changes in these properties at 2200 C. Therefore, the binder material in the Battelle samples must retain some identity in the final product. If the binder material had graphitized in the same manner and to the same extent as filler coke, there should have been a marked change when the temperature required for binder graphitization was reached. This series is currently receiving both high and low temperature radiation damage.

A general improvement in graphitic structure, i.e., crystallite growth and inter-planar contraction, was observed after 750 MD/AT of 500°C irradiation of National Carbon Company experimental graphite. The better carbon ordering, however, was accompanied by a slight physical expansion. This remains in the same realm as the still unexplained physical contraction accompanied by crystallite break up under high temperature irradiation. A possible solution may be in physical distortion as a function of the crystallite orientation factor, which is under investigation. It may be necessary to change sample size such that distortion can be measured accurately in three directions on the same sample.

High Temperature Graphite Irradiation, GEH-9

Parts for two new test thimbles were fabricated during the month and one thimble was completely assembled and shipped for installation in the MTR. Pressure testing and radiographing showed the new technique for welding the aluminum thimble to be completely satisfactory.

Temperature records from the second irradiation just discharged from the MTR were received and showed that the control equipment maintained the sample temperature within ± 2 C at 572 C. As reported previously, however, in the case of three of the samples it was not possible to maintain the desired operating temperature because of the suspected creep of the 304 stainless steel sample holders. These parts have been replaced by molybdenum in the new thimbles. It should be noted that the temperature control of the sample which did operate properly is more precise than any irradiation of this type yet reported. Because of the uniform operation of the MTR, the three uncontrolled samples were irradiated at very close to 300 C for most of the six week period.

Unexpectedly large values of graphite contraction were observed in a sample discharged from the first GEH-9 experiment. By two independent measurement techniques the physical length of this sample changed by -0.05 per cent for a 525°C irradiation of 6.5×10^{17} nvt greater than 1 mev. This measurement, although preliminary, appears to be significant because the change is many times greater than ever observed for a comparable exposure in a Hanford pile. Samples from the second irradiation may provide confirmation of this observed phenomenon which may be due either to the higher irradiation temperature or the different flux spectrum.

Thermal Annealing of Irradiated Graphite

A series of isothermal anneals of a graphite sample exposed for 464 MD/CT at 127°C has been completed and analyzed. The distribution of damage among the activation energies was calculated from changes in C_0 spacing. Some of the 35 kcal (approximately 200°C) peak found in cooled test hole samples still remained in this sample after irradiation at this 127°C temperature. A slightly more intense peak was found at 65 kcal (approximately 600°C annealing temperature). The series will be completed by the analysis of a sample irradiated to 464 MD/CT at 184°C.

High Temperature In-Pile Heater

Conceptual design has been nearly completed and check prints are being drawn for an in-pile heater assembly which will permit irradiation of samples of materials at controlled temperatures up to 1500 C. This assembly will be a semi-permanent unit mounted in a side test hole. A stainless steel or inconel outer shell will inclose the heater and connect to the pile face to form a gas tight seal. A resistance heater consisting of a tubular alundum core wound with molybdenum heating wire will be suitably insulated and mounted within the shell and operate in a helium atmosphere. Charge and discharge of samples will be accomplished through an inner tube which will connect the heater core with the pile face. Temperature control will be maintained through a platinum-platinum iridium thermocouple for control system similar to that used for the GEH-9 experiment.

Physical Properties Measurements

Routine X-ray parameter measurements were made on 53 graphite samples. Included were temperature-of-graphitization series produced by Battelle Memorial Institute and National Carbon Company. These series had received high temperature irradiations. Unirradiated samples being prepared for MTR-GEH-9 exposure were also included.

Twenty graphite piston samples which had been soaked in HNO_3 solution were run for C_0 parameters. Five of these samples were also run for thermal conductivity and electrical resistivity.

Thirteen thermal annealing runs were made on a sample with 464 MD/CT exposure at 127°C and one run was made on a sample with 1135 MD/CT at 118°C.

In-Pile Creep Measurements

A mock up of an in-pile creep measuring apparatus which was used in the Chalk River pile (AERE-MR-795) has been constructed to determine its applicability for use at Hanford. If its sensitivity and accuracy are sufficient, a device will be constructed and measurements on the creep of aluminum and zirconium tubes will be made at high temperature under irradiation.

PILE GRAPHITE STUDIES

PT 105-532-E, Graphite Burnout Monitoring

Fifteen CSF graphite samples charged into F Pile on August 27, 1955, were discharged on July 22 after an effective exposure period of 157 operating days. The samples, which were four inches long and 0.40-inch in diameter, were exposed in three graphite boats positioned symmetrically in bare process channel 3580-F. The average carbon dioxide percentage in the pile atmosphere during this period was about 86 per cent. The average graphite burnout rates, as determined by sample weight losses, are presented in the following table.

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Average Graphite Burnout Rates in 3580-F

<u>Boat No.</u>	<u>Distance From Front Van Stone Flange to Centerline of Boat (Feet)</u>	<u>Average Burnout Rate (Per Cent Weight Loss Per 1000 Operating Days)</u>
1	11.0	-0.25
2	20.75	-0.81
3	30.5	-0.18

Although the above burnout rates are slightly higher than the current rates observed in the other piles, this can readily be attributed to high water leakage, admission of oxygen during numerous tube replacement outages, and higher carbon dioxide concentration at F Pile. The above burnout rates are of no great consequence to the structural integrity or life of the pile, which is encouraging in view of the relatively severe operating conditions at F.

Irradiation of Sheathed Thermocouples in Channel 2182-D

Performance of the five iron-constantan, five chromel-alumel, and five sheathed chromel-alumel couples in this stringer was generally satisfactory during the month, however examination of temperature records reveals some surprising behavior characteristics of certain couples for the few days following a pile startup. Temperature readings of the chromel-alumel couples following two July startups appear to show that the observed variations in reading can largely be ascribed to control-rod movement.

KW Pile Thermocouple Failures

Resistance measurements taken on the stringer thermocouples at KW Pile July 20 show 29 of the 64 couples to be unreliable. Of these, 15 are apparently shorted out in a similar manner to the KE failures, and 14 have abnormally high resistance, indicating they are corroded or broken. Several of the latter thermocouples are still in good enough condition to give plausible readings, but it is likely that they will ultimately fail. Resistance of G couples in representative regions of the pile has not yet been checked.

KW Pile Graphite Temperature Distribution

Graphite temperature distribution in KW Pile has been radically changed during the second phase of PT-105-630-A, "Pile Power Distribution Control at K Piles" now being conducted by the Pile Physics Unit. The current control rod configuration utilizes rods in the front, rear, top and bottom banks, with little or no use of the central rods (all the half-rods are centrally located). As a result, the higher graphite temperatures occur now at the center of the pile in the 0.030" coring zone, whereas temperatures in the greater coring zones are all lower. With these changes in control-rod pattern longitudinal temperature profiles are similar to those in the older Hanford piles, with the graphite temperature through most of the pile being somewhat more uniform and with very steep temperature gradients in the front and rear reflectors. This appears to be a more desirable graphite temperature distribution than has occurred in the K Piles before; however, it has not yet been demonstrated that it offers an advantage in control of heat cycles.

Calibration Unit for Beckman Continuous O₂ Analyzer

Because of the need for periodically verifying the reliability of a continuous oxygen analyzer when it is used to observe process specifications, a calibrating apparatus was devised and tested. This apparatus consists of a chromous chloride scrubber to remove oxygen from the pile gas sample stream, an electrolytic cell to generate a controlled amount of oxygen which is then mixed with the gas stream, and a wet test gas meter to measure gas stream flow. The oxygen concentration in the gas stream entering the analyzer can be determined by calculating the amount of oxygen generated in the cell and dividing it by the total gas flow; the Beckman analyzer reading is then compared with the known value. The analyzer at C Pile agreed with calibration within 0.002 per cent O₂ at 0.057 per cent O₂. Some minor revisions are being made to the apparatus prior to further testing.

Pile Distortion

Probe tests of the three traverse tubes at D Pile on July 13 showed that the top far corner tube will accept a nine inch maximum probe. This indicates that this region of the pile will require charging of four inch metal upstream in the near future. Review of distortion trends had led to prediction that D Pile would reach limiting curvatures sometime in 1956.

PILE COOLANT STUDIESProduction Tests

Evaluation of Separan 2610 for use in process water treatment is essentially complete with respect to:

1. Solution preparation,
2. Chemical feed requirements,
3. Chemical addition location,
4. Quality of treated water,
5. Water plant operation efficiency,
6. Film formation in reactor flow channels, and
7. Reactor effluent activity.

Evaluation of Separan is continuing with respect to:

1. Corrosion of aluminum reactor components, and
2. Waste disposal-chemical toxicity.

Preliminary evaluation indicates that Separan 2610 should be entirely satisfactory as a replacement for activated silica in the preparation of Hanford process water.

The water-mixing slugs charged into the reactor under PT 105-564-E are still under test. Four tubes charged under this Production Test (two control tubes and two test tubes) contain thermocouples located in the 12, 4, 6, and 8 o'clock positions to give a temperature distribution of the water in the annular space around the slug. Although data to date are inconclusive, the following table gives a summary of the average temperatures obtained from these thermocouples as of July 20, 1956.

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Average Temperatures of Tubes Containing
Thermocouple Probes Under PT 105-564-E

<u>Thermocouple Location</u>	<u>Regular Charge</u>		<u>Contain 3 Mix Slugs</u>	
	<u>2381-D</u>	<u>3271-D</u>	<u>2980-D</u>	<u>3065-D</u>
1 12 o'clock	91	86	84	81
2 4 o'clock	112	Thermocouple Out	80	82
3 6 o'clock	102	86	100	82
4 8 o'clock	93	107	99	85
Outlet	94	88	85	84

The first uranium metal discharged from the Zircaloy-2 tube installed in channel 3586-D under PT 105-555-E was examined and weighed during the month. Aluminum jacket weight losses were as low as or lower than weight losses observed on slugs exposed in aluminum tubes. The initial charge was exposed to 634 MWD/T. The tube operated normally during the month with the second charge of weighed metal slugs.

Four weighed slug charges were discharged from 105-F on July 14, 1956. Three of these charges have received their pile exposure in pH 7.65 process water and the fourth charge has received its pile exposure in pH 7.0 water. Weight loss data from these charges are not yet available.

A rough draft copy of document HW-44002, "Supplement A, PT 105-554-E, Evaluation of pH 7.0 Process Water", is routing for approval. This supplement authorizes continued operation of F Reactor with half of the reactor cooled with pH 7.0 process water. The pH of process water used to cool the control half of F Reactor will be changed (under the PT supplement) from pH 7.65 to 7.3.

Corrosometer probes were installed in the near and far riser water sample lines in 105-F on July 19, 1956, to obtain a quantitative indication of the relative corrosivity of pH 7.0 and pH 7.65 process waters toward steel components of the reactor effluent system. Measurements of the relative corrosion rates of these SAE 1010 to 1030 steel probes should be available by August 31, 1956.

The potential chemical toxicity of Separan-treated water if used for drinking purposes is being investigated. Current discussions include presentation of Separan toxicity data by members of the Biochemical Research Department of the Dow Chemical Company, and discussion of approval requirements with members of the HAPO Health and Safety Section and the Washington State Department of Health.

File Process Tubes

Eighteen process tubes were examined in the basin during the month.

A hole was found in leaker tube 2982-D in an area of severe external corrosion located 8-1/2 feet from the rear Van Stone flange. A slit between the ribs approximately four inches long was found in tube 1378-H located eleven feet from the rear Van Stone flange. The leak was not found in tube 0782-H.

Fifteen tubes have been examined in the 189-D Metallurgical Laboratory. Two tubes were checked for intergranular corrosion between the ribs but no evidence of intergranular corrosion was observed.

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In-pile Probolog examinations were conducted on 89 tube replacement program tubes, two leaker tubes and three Development Test 105-560-E tubes. Examinations conducted on F Pile tubes revealed that the residual wall thickness of fringe zone tubes is considerably thicker than is indicated by calculations and that almost all tubes suffered from light to heavy external corrosion and, consequently, were tubes that required replacement. All H Pile tubes examined had wall thicknesses of thirty mils or less, two leaker tubes had average wall thickness of 24 and 28 mils with exceptionally bad areas of corrosion attack at the location of the holes. D Pile tubes examined were found to have wall thicknesses slightly thicker than indicated by calculations. C Pile Development Test tubes examined continue to show points of higher corrosion at the location of two downstream trunion blocks.

The procurement of 12 B, D, F size ribless tubes and six KER size ribless tubes to be fabricated in alloy M-257 (APMP, seven to eight per cent Al_2O_3) was initiated during the month. These tubes are being procured for the development testing of the high temperature-high strength aluminum alloy M-257. In addition to these tubes, work is continuing by Alcoa on the fabrication of ribbed M-257 process tubes under Contract SO-7.

Zirconium Process Tubes

A total of 2,234 pounds of zirconium and Zircaloy-3 forged billets was shipped to Superior Tube Company from the Bureau of Mines for use in the fabrication of ribbed zirconium process tubes. This should be sufficient for approximately half of the 60 tubes to be fabricated on this development contract. Negotiations with Allegheny-Ludlum Steel Corporation on a similar development contract are nearing completion. Approximately 3000 pounds of zirconium and Zircaloy-3 forged billets are ready for shipment to Allegheny-Ludlum when contract negotiations are completed.

Preliminary investigations are being made to determine the feasibility of zirconium ingot piercing and ingot extrusion to billet size for use on the fabrication development contracts. It is estimated that as much as 18 per cent savings in metal yield can be realized by these billet fabrication techniques.

Flow Laboratory Studies

2S aluminum Minislugs exposed in zirconium Minitubes at 115, 135, 155 and 175 C using pH 6.0 water with 2 ppm. dichromate added have been discharged after 23 days exposure. The corrosion rates are approximately one-third of the rate of Minislugs exposed for 20 days in pH 7.0 water with 2 ppm. dichromate added.

The test of 2S and M-388 aluminum jacketed slugs in pH 6.0 process water has been discharged at 23 days exposure. The corrosion rate of M-388 aluminum was slightly less than that of 2S aluminum.

Projection slugs exposed in pH 7.0 process water at 125 C have been discharged but corrosion data are not yet available. Visual inspection of the projection slugs showed a slight change in film pattern downstream of the projections.

The chattering test on projection slugs was completed during the month. In this test five heavy-metal projection slugs were exposed in a ribless 63S B, D, F size tube to cold process water at a flow rate of 46 gpm. for approximately 30 Days.

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Examination of the slugs and tube revealed no damage from chattering or indications that chattering occurred during the test.

Operation of the 189-D rupture test facility continued during the month. Presently being tested is a studded piece with 1/4 inch diameter welded studs. A 1/8 inch diameter by 1/4 inch deep hole has been drilled in the slug and it is being exposed to 25 gal. per minute, 125 C water in a ribless tube.

Zirconium Scrap Disposal

A trip to the Bureau of Mines was made on July 7 to observe the handling and burning of 23 kegs (approximately 8000 pounds) of zirconium scrap material that had been stored for 4 to 5 years. Because of the uncertainty as to the history and composition of this material, extra care was taken in its handling and burning. The operation was completed in about five hours without incident.

Bureau of Mines personnel expressed the opinion that zirconium scrap generated from machining operations is free of hazards. Their opinion was based on their experience in handling such scrap. Attempts were made to ignite zirconium turnings and fines. This material was reluctant to burn and when a fire did catch it very quickly went out. The burning would not propagate to larger chips and turnings. It was felt that added caution was warranted in handling zirconium sawdust and grinding fines. This material burned much easier than the turnings and chips.

The Bureau of Mines personnel do not consider metallic zirconium, except possibly in the form of finely divided powder, to be explosive or extremely hazardous to handle. They do consider a not-too-well-defined mixture of lower zirconium chlorides, zirconium carbide, and magnesium that forms as a black powder on the furnace liner in the vapor phase section of the reduction furnace to be quite explosive.

Mr. D. W. Richardson and Mr. R. L. Johnson of the Bureau of Mines visited Hanford on July 18 to inspect the zirconium scrap stored on site and to advise as to methods of handling and disposing of this material. It was their opinion that the zirconium scrap stored at Hanford, if handled with normal and reasonable care, should be free of hazards.

Process Specifications

Changes in Reactor Cooling Water Treatment Process Specifications 1.00, 2.00, 4.00, 5.00, and 9.00 were approved on July 18, 1956, and are now routing to the Manufacturing Department for acceptance. These Process Specification changes are listed briefly as follows:

- 1.00 (Coagulant Addition) Revision of Basis to include the use of Separan 2610 as well as activated silica in conjunction with aluminum sulfate coagulant in treatment of reactor cooling water.
- 2.00 (Coagulation or Filtration Aid Addition) Change from Specification to Interim Specification. Major revision of both Basis and Specification to provide for the preparation of Separan 2610 solutions and authorize the addition of either Separan 2610 or activated silica as Separan addition facilities and drinking water treatment requirements permit.

- 4.00 (pH Adjustment) Major revision of both Basis and Specification to authorize the use of reactor cooling water with pH values within the range 6.9 to 7.1. Broader pH limits of 6.9 to 7.65 are included for operation when temporary acid addition facilities fail, and excess aluminum sulfate must be used for pH control.
- 5.00 (Filtration of Process Water) Revision of Basis to include the use of Separan 2610 as well as activated silica in conjunction with aluminum sulfate coagulant in treatment of reactor cooling water.
- 9.00 (Restriction on Chemical Additives to Process Water) Addition of Separan 2610 to list of Specified Materials which may be added to reactor process water.

RECIRCULATION TECHNOLOGY

H-Loop Recirculation Studies

Run number 17 has accumulated two weeks' exposure at an average outlet temperature of 190°C. The outlet temperature has been restricted by reduced reactor power levels and by frequent reactor scrams. Present plans call for the discharge of the tube at the end of August. A program is being formulated for de-activation of the loop and placing it on stand-by in preparation for startup of the KER Facility.

Corrosion data have been obtained on Run Number 16. Conditions of the run were:

Tube outlet temperature	- 191°C
Flow	- 13.1 gpm.
Exposure Days	- 28
pH	- 5.6

The outlet temperature again was affected by the reduced level of reactor operation. The water make-up rate was high and as a result, the pH built up higher than desired. Corrosion data based on uncleaned weights indicate rates as predicted by the correlation published in previous interim reports. The "Ike" slugs (1.75 per cent enriched) were at fairly low powers (54 KW per foot) and temperatures (140°C) but the correlation still was adequate. Results of the present run which is investigating powers of 60 to 63 KW per foot and temperatures of 220 to 230°C should provide valuable data concerning the role of power in affecting corrosion rates.

Corrosion coupons have been discharged from the loop test section and from autoclaves located on the loop and clean-up deionizer. Visual appearance is good but as yet weight loss data have not been obtained.

Radiometallurgy is examining an M-388 alloy canned fuel element to determine the mode of corrosion. It has been established that so called "donuts and "craters" are actually mechanical damage. Also, it has been found that the metal is not suffering intergranular attack.

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ELMO Loop Development Activities

ELMO-2 - Final data have been obtained from the neutral pH test at 150°C. The corrosion rates of the aluminum alloy stabilized at about 1.3 mils/year. After 60 days, it appeared that corrosion of the carbon steel samples had ceased.

The current test is evaluating the effects of phosphoric acid at pH 4.0.

ELMO-4 - Four slug rupture tests were performed using projection fuel elements in a ribless KER tube. Test temperatures ranged from 220 to 240°C. In the worst rupture about one-third of the annulus remained unplugged after 12 hours operation at temperature. In each case the slugs discharged easily from the tube. A device was developed to measure the force required to discharge the ruptures; however, in these tests the force was so low that no force indication was obtained.

ELMO-6 - The loop was operated at 250°C with neutral pH water for a total of 1600 hours. The aluminum corrosion rate after this time is approximately 23 mils per year. Carbon steel corrosion rates appear to be linear with time after about 600 hours at about 0.06 mil per month. The test will continue to 1800-2000 hours.

KER Activities

Predictions of aluminum corrosion rates under KER conditions indicate that outlet temperatures of 250°C will be feasible for periods of about one month; with 200°C outlet water, allowable exposures of between two and three months are predicted.

Pressure drop tests have been run for standard fuel elements using stud-welded projections for centering in a KER tube and for cluster elements using a spider external to the cluster rods. With the cluster rods in line, the pressure drop for cluster elements is three-fourths as much as for the standard cylindrical projection slug. With the rods of adjacent elements 45° out of line, the pressure drop for the cluster element is 1.75 times that of a standard projection element. This leads to the proposal that the elements be pinned so they will be in line, provided that heat transfer tests are favorable for in-line orientation.

Construction of a fluid polariscope for visually determining flow lines around fuel elements continued. Full scale lucite models of the fuel elements and other components have been fabricated.

Two failures have occurred during hydrostatic testing of compression fittings for KER tubes. One failed on a ribless tube at 3800 psi; the second failure occurred at 3500 psi on the ribbed tube. Plans for future testing of compression fittings include such possibilities as the use of hardened compression ferrules, or possibly annealed tubes to increase penetration into the tubes. Based on these two compression fitting failures, ELMO-7 will be run with a Van Stone flanged test section until compression fittings are proved reliable.

Organic Coolant Program

An experimental program was initiated to develop technology relating to the use of organic coolants in a Hanford reactor. The primary advantages of this type of coolant are elimination of aluminum and uranium corrosion effects, and the attainment of high coolant temperatures on the order of 300 C in a relatively low pressure

system. Recent tests at other sites have shown monoisopropylbiphenyl (MIPB) to be a promising candidate for a reactor coolant. The proposed on-site program is aimed at extending available technology and applying it to Hanford conditions. Progress to date consists of outlining the program, designing and fabricating an in-pile test section, designing and procuring components for the associated loop, and designing and procuring components for a separate "heated wire" loop. The former facility will permit irradiation of MIPB to determine radiation damage effects; the latter apparatus will give a measure of the coking effects as a function of heat flux, velocity, and coolant composition.

KE-KER SEMIWORKS

Activities during the month included the training of new personnel, planning for the start-up of the KER Facility, and the operation of the 1706-KE Water Studies Semiworks.

1706-KE Water Studies Semiworks

The series of in-pile tests to determine the effects of specific elements on effluent activity continued. During the period from July 15 to 23 a phosphorous solution was injected into process tube 4557. The out-of-pile filter evaluation tests continued throughout the month. The flow through Filter No. 1 was increased from 450 to 550 gpm. ELMO-5 was down for the entire month to repair the main circulating pump. A representative from the Bingham Pump Company checked the pump and recommended that it be returned to the factory for repairs. ELMO-5 is now being modified for the installation of a canned rotor pump. The fabrication and installation of ELMO-10 has been completed. This loop is to provide out-of-pile information on various contaminants in the water to be used in the KER Facility.

Out-of-pile tests to evaluate the corrosion of the one per cent nickel-aluminum jacketed slugs continued during the month. It was necessary to replace four ruptured mock-up tubes during the month. It was discovered during the last tube replacements that each steam jacket has two steam inlets. Each of the inlets is being baffled and no tube ruptures have occurred since this change.

Development work continued to adapt the KER nozzles to ribless tubes. Additional tests using compression fittings were run. The fabrication of the screw type fittings has been completed. Two ribless and one ribbed Zircaloy tubes were welded and pressure tested during the month. One ribless tube must be rewelded. Then all five tubes now on the project will be sent to the 200 Areas for complete radiographic and ultrasonic examination.

Recirculation Test Facility

The beneficial use date for the out-of-pile portion of this facility is now set for approximately September 1. The tie-in outage for the in-pile portion is expected to be sometime during the month of October.

Outlines have been prepared for the Operating Manual and the Start-Up Program. The rough draft of the Operating Manual will be complete by August 20.

Discussions are being held with Radiation Monitoring personnel concerning radiation work procedures, emergency procedure, and radiation monitoring equipment necessary

Pile Materials Sub-Section

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for the operation of the KER Facility. Preliminary talks have been held with Radiological Sciences personnel concerning the plant requirements for inventory of discharged liquid waste.

All essential equipment has arrived with the exception of the boiling-point suppression instrument and the eighth canned rotor pump.

FUEL TECHNOLOGY SUB-SECTIONPROCESS TECHNOLOGYFabrication of Water-Mixing Fuel Elements

Heliarc welding was found to be impractical for joining water-mixing projections to canned fuel elements because too high a temperature develops in the slugs during the welding process. Closure welding yields for slugs having the projection as an integral part of the cap are low due to the small area available for torch manipulation and for arc-starting. It has been suggested that water-mixing slugs be assembled in cans having a thick base so that the one-inch high projection could be machined on the base after standard canning and finishing. Canning tests have indicated that the present 45 second canning cycle (55 second can preheat) is adequate for preheating cans with the required base thickness.

Penetration Detection

Tests have shown that the eddy current test for Al-Si penetrations may not be as sensitive to right cylindrical shaped penetrations as to conical shaped penetrations of the can (typical geometry of Al-Si penetration during canning). Test slugs were fabricated by drilling small holes through the cans prior to canning. Slugs with initial hole diameters of 5, 10, 15, and 30 mils. were not rejected by the penetration tester.

Slug Welding With Argon-Helium Gas Shields

Initial slug welding tests using argon-helium mixtures for the gas shield in place of argon have indicated that faster welding rates can be achieved with the mixed gas. Also, costs are reduced since helium costs only about one-fourth as much as argon.

0.94% Enriched Uranium Slugs

Six hundred and sixty-one six-inch 0.94% enriched uranium cores were canned by the unbonded process ("B" canning process) for the Exponential Physics Unit and the Physics Development Unit. These slugs will be used for buckling experiments and to determine the optimum fuel-target (Li-Al) ratio. They will be recovered for dip canning and subsequent pile tests.

Nuclear Safety

The nuclear safety criteria for the handling and storage of enriched eight-inch solid uranium cores with 1.44% enrichment have been determined and specifications are being prepared.

Bond Porosity in Lead Dip Canned Slugs

The combined void and bond test reject rates, a qualitative measure of the prevailing amount of bond porosity, continued to be abnormally high during the period June 15 to July 15. The combined rate for Fernald lots was about 6 1/2%, the rate for Mallinckrodt lots was about 14%. The hydroxyl content of the FMPC heat treating bath ranged from 1.2 - 1.45%. Hydrogen pick-up during heat treating has significantly affected canning yields in the past when the hydroxyl content has exceeded 1.1%.

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Gas Studies as Related to Slug Canning

Further analysis of gas extracted from large unbonded areas on M and K lot material showed that air was entrapped in the assembly and that a large concentration of carbon monoxide was present. Carbon monoxide is also present in considerable quantities in gas extracted from Al-Si samples taken from the canning bath.

PROCESS DEVELOPMENT

Uranium Processing

Eighteen tubes of slugs fabricated from delay-quenched uranium rod (PT 105-613A-54MT) were charged in the KW pile to determine the effect of this rod heat treating procedure on dimensional stability.

The use of 1.44 enriched material to pilot higher slug powers comparable with those forecast after CG-558 water plant expansion has been programmed for I & E and cored slug production tests. A test is being designed to verify the assumption that "in pile" slug behavior at higher powers obtained through enrichment will be indicative of the behavior of slugs having natural uranium cores at similar power levels obtained from normal pile power increases.

A revised schedule for enriched uranium is listed below in the order of priority. It is based on the assumption that the slug machining facilities at FMPC will be operated at full capacity and that the enriched UF₆ from the gaseous diffusers will be delivered promptly as required at FMPC.

<u>% U-235</u>	<u>No. Slugs</u>	<u>Slug Type and Expected Use</u>	<u>Date Required At HAPO</u>
1.45	850	I & E slugs for KE	All 1.45 E slugs
1.45	1180	Comparison slugs for 1.45 I & E slugs	at HAPO by
1.45	840	I & E slugs for old piles	October 31, 1956
1.25	2750	Cored slugs for old piles	by November 30, 1956
1.60	1575	Cored slugs for KE Experimen- tal use	All 1.60 E slugs at HAPO
1.60	650	I & E slugs for KE Experimen- tal use	January 1, 1957

Assembly Processes

Autoclave tests have shown the SEP hot pressed slugs to be less susceptible to undercutting than Hanford hot-pressed slugs. This is true of both unbaked and baked (250° C for 30 days) slugs.

Continued studies have tended to confirm previous indications that, with suitable adjustment, the Frost Test is satisfactory for application to hot-pressed slugs. If the bonds are poor enough to result in impaired heat-transfer, the Frost Test will detect the bad spots. Hot-pressed slugs which have extremely strong bonds when freshly canned, show considerably weakened bond strength after prolonged static heating at 250° C.

Irradiation of tensile specimens having hot-press bonds as authorized under PT-105-537-SI, "Irradiation Service Request HAP0-165 Irradiation of Uranium Bond Tensile Specimens," is nearly completed. Of the 32 specimens charged in the reactors, 24 have been discharged and are awaiting completion of radiometallurgical examinations.

Six hot-pressed and six regular production fuel elements were charged into the 314 Building flow loop and exposed to flowing 300 Area water at 100-110 C. These slugs were periodically inspected and measured. A uniform corrosion of about 4 mils/month was found for both types of slugs. All of the hot pressed pieces ruptured between 190-220 days, while only one of the six regular production slugs has ruptured to date at 309 days. These tests did show the disadvantage of the old contact points that had been used for the first electroplating studies. These contact points were platinum and were blunt providing a large surface area, resulting in an area having either a thin plate or no plate at all. Inevitably these showed up as weak points in corrosion tests. The equipment used now has stainless steel contact points and smaller contact areas. Metallographic studies and corrosion tests have shown that these are much superior. Fuel elements plated with the new equipment have been hot-pressed and are now being tested in the 314 flow loop for direct comparison with the older pieces.

Additional auxiliary equipment was added to the vacuum-canning equipment to speed up the assembly process and to improve the uniformity and quality of the slug-to-can bond. The work platform was enlarged and temperature recording instruments were set in a panel. An inert gas pre-heat furnace was installed for pre-heating can-sleeve assemblies. The canning sleeves have internal tubes to prevent distortion of the I & E can tube during the pre-heat. A small pot furnace for pre-heating the Al-Si charge also was installed. (Pre-heating the Al-Si reduces the canning cycle by approximately four minutes by shortening the time required to melt the Al-Si).

The use of pre-heat equipment in addition to decreasing the canning cycle to approximately 6 minutes, has improved the quality and consistency of central-tube-bonding. Of 35 slugs canned, 25 have shown very satisfactory characteristics in regard to completeness of bonding and ease of welding.

Anodizing

A procedure for canning in pre-anodized cans was developed. First canning experiments demonstrated that a 1 mil anodic film prevents the formation of the normal rounded weld bead. However, if the anodic film is removed by chemical treatment 0.1 of an inch or so below the point on the can where the weld is formed, an acceptable weld is produced. If more cans are pre-anodized the top of the can will be suitably masked so that no film stripping is necessary. The normal cap and can cleaning prior to dip canning and the penetration etch before autoclaving which involve corrosive chemicals incompatible with the anodic film are eliminated in this procedure.

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The 432 anodized pieces sealed in the production autoclave were moved to 100-D for charging tests in the 189-D charging machine mock up. These pieces have a 1 mil oxalic acid anodic film which is expected to be more resistant to film cracking during in-pile exposure than slugs with 2 mil coatings. Tests by the Mechanical Development Unit of the Pile Engineering Sub-Section indicated slugs with 1 mil of anodic film are gouged less than autoclaved pieces, even though charging pressures are slightly higher. Further tests will determine the effect of thicker films and harder aluminum alloys on scoring.

DEVELOPMENT OF NEW FUEL ELEMENTS

Wafer Fuel Elements

Two I & E Ni-Al jacketed fuel elements containing 3/16" thick uranium washers were discharged from the Materials Testing Reactor July 5. The irradiation was GEH-4-8 and began June 14. One of the elements was 4.8" long and contained stamped washers, the other, 9" element, contained machined washers. Examination of the fuel elements revealed no deterioration, although one of the elements was scratched during discharging. These fuel elements will be replaced by two similar ones, which are being installed in a process tube with improved thermocouples for accurate power measurements.

The GEH-4-8 fuel elements are being returned to HAPO for weight and dimension measurements by Radiometallurgy.

It was reported last month that uranium washers could be welded lightly together and canned as one piece. Autoclave tests have subsequently proved that when such assemblies fail, the radial expansion is sufficiently great to damage surrounding process tubing. This technique of assembly will not be investigated further.

Internally-Externally Cooled Fuel Elements

Testing and final inspection was completed on the second group of enriched uranium (1.44% U₂₃₅) I & E slugs canned for PT 73 MT. The yield on the second group (196 slugs) was 39.8% as compared to 12.5% for the first group (80 slugs). The differences in canning procedure between the two groups are as follows: the first group was canned on a 45-second cycle, without vibration, and with caps as received; the second group was canned on a 50-second cycle, with vibration of the can and sleeve during submersion, and with an Al-Si reservoir in the cap.

Another group of 294 enriched I & E slugs were canned for exponential physics experiments. The test results have not been obtained since the slugs have not been finished.

Production Test Design documents are being issued to authorize charging of dip canned I & E slugs in the "K" and Old piles. Because of variations in the existing tube geometries at K and the Old piles which require corresponding variations in I & E slug dimensions, it is necessary to evaluate each slug design. After completion of "out of pile" tests of prototype I & E slugs, one tube of material will be charged to low goal exposure to verify the validity of the theoretical calculations and to detect possible unfavorable attendant operating conditions. A "run to rupture" test will be based on four tubes each of I & E and standard fuel elements. Two ruptures will be taken in each type of material unless the inferiority of either geometry is demonstrated without taking further failures.

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Four other tubes of I & E slugs will be irradiated to varied exposures for evaluation of dimensional stability characteristics. It is anticipated that a sufficient number of cap and can components of the "K" and Old pile geometries will be available to permit canning of production test material by September 1.

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

A schedule for the canning of 29,000 I & E slugs before December 1, 1956 was proposed in HW-44060. Further steps are being taken to attain this goal by securing suitable test equipment and by preparing detailed plans for the program.

Self-Supporting Fuel Elements

Thirty projection fuel elements were fabricated by attaching one-inch long ribs to the canned element jacket using the Graham stud welding process. The stud welder has been modified to handle ribs .080-inch high x 1/8-inch wide x 1-1/2-inch long. Two aluminum alloys were used, 1100 and 6063, with the 6063 alloy ribs producing more consistent results than the 1100 alloy ribs.

The ribs are susceptible to misfiring where no arc (and no weld) occurs when the rib touches the jacket. High speed motion picture photography has shown that the arc duration is extremely short, 0.003 second, with no pre-ignition occurring before the rib touches the jacket. It has been found that abrading the jacket surface just prior to welding insures reproducible arcing characteristics. The 30 projection fuel elements were transferred to the 189-D Building for tube charging evaluation tests.

MATERIALS DEVELOPMENT

Ni-Al Components

About 10,000 caps and 1850 out of 10,000 cans fabricated from the Al-Ni alloy containing 1% Ni have been received. The remainder of the cans are expected by the end of July. One thousand will be canned using the M-388 alloy components to determine the optimum canning procedure. It is presumed that the majority of the test slugs will be suitable for pile and flow laboratory tests.

Water Composition and Aluminum Corrosion

To measure the effect of the various components of water on aluminum, samples of M-329 aluminum were exposed to waters of different compositions for two weeks at 92 C.

The waters were made up of distilled water and sodium chloride, sodium bicarbonate, sodium nitrate, sodium sulfate and hydrogen peroxide. The solutions contained up to 100 ppm of Cl^- , H_2O_2 , HCO_3^- , NO_3^- , and SO_4^{2-} . The only ion which appeared to affect the corrosion rate was bicarbonate ion. Sodium bicarbonate has a strong effect on pH, making solutions more basic, and by further testing, it was determined that the bicarbonate contributed to the corrosion indirectly through its effect on pH.

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These results suggest that pH is the only important factor in water quality. This conclusion is proven only for conditions of (1) low flow, (2) high temperature, (92 C) (3) no pitting, (4) no scaling, and (5) reasonably pure water (400 ppm total solids or less).

Chromate Inhibition of Aluminum Corrosion

A common means of removing the corrosion product film from aluminum is by stripping in 2% chromic - 5% phosphoric acid. The chromate present in the stripping solution inhibits the attack of the phosphoric acid on the base metal. A test was conducted to determine if the chromate inhibition persisted during exposure of previously stripped aluminum samples. It was found that the samples exposed after stripping corroded as though they were fresh samples with no residual inhibition because of the stripping.

High Temperature Corrosion Studies

Data recently obtained on corrosion of various alloys at 200 C have been combined with various low flow and static autoclave data to produce a corrosion versus temperature diagram for M-388 alloy. Plot of log corrosion rate versus $1/T$ ($^{\circ}K$) is linear from 100 to 350 C. The corrosion rate is approximately 6 mil/year at 350 C, 1.2 mil/year at 250 C, 0.25 mil/year at 100 C. Data from the dynamic loops, EIMO No. 2 and No. 6, indicate higher rates and considerably greater slope. The two curves intersect at about 100 C indicating that the effect of flow increases with temperature.

Correlation of Corrosion Data

The corrosion data from the Flow Cup Laboratory, from in-pile corrosion measurements (PT-9, 503, 509, 513 etc.), from the in-pile measurements of the effect of pH (PT-526E, 509E, 525E) and from H-Loop were analyzed by means of multiple regression to give the equation:

$$\log T.C. = 1.21 - 2.58T' + 0.04P + 0.94 \log t + 0.52 \text{ pH}$$

where T.C. = total corrosion in mils

$$T' = 1000/T (^{\circ}K)$$

P = Power in KW/8" slug

t = time in days

This equation was developed for predicting future corrosion rates in present and future piles. For this reason, the data were weighted to give the most emphasis to the experiments run under conditions most relevant to future piles. The high temperature (above 1000) data from H-Loop were given full weight. The low pH, low temperature data of Miller(1) were given 1/3 weight. The 913 in-pile points at pH 7.7 were given 1/5 weight, and the Flow Cup Laboratory data was given 1/10 weight, since it is all at zero power.

(1) Miller, N. R., Final Report Production Test-105-509-E, The Effects of Low pH Alum Water on Pile Operation, HW-32603 (Secret) 7-30-54.

This equation is valid only over the range from which the data were gathered, which was

Temperature	50 to 200 C ($T' = 3.19$ to 2.11)
Power	0 to 35 KW/slug
Time	14 to 360 days
pH	5.0 to 7.7

The data are subject to several limitations, and these apply to the equation also. There is the inherent variance in corrosion experiments. This variance increased by the difficulties of in-pile experiments and measurements on hot slugs, and further increased by the difficulties of stripping the high temperature slugs from H-Loop. These experimental difficulties render experiments with a penetration of less than 1 mil almost useless. Likewise experiments with penetrations of more than 10 mils are rare because of danger to the pile. This restricted range of the total corrosion gives strong negative correlations between the "independent" variables; that is, slugs that run at high powers run at low local water temperatures, while low power slugs run at high local water temperatures. Experiments with high corrosion rates run for short times, and with low corrosion rates run for long times.

This negative correlation of independent variables is necessary, as an experiment run at 200 C, pH 7.7, and 30 KW per 8" slug would dissolve a 40 mil can in 4.7 days. However, it greatly restricts the data and the range of validity of the equation.

The equation implies that a DPR with zirconium tubes and aluminum jacketed slugs is practical from a corrosion point of view. At an average power of 25 KW/ft, pH 5.0, 200 C outlet, and 500 MWD/T exposure the total corrosion of the worst slug is estimated at 5 mils. The equation also implies that the dissolved salt affect the corrosiveness of our waters only as they affect the pH. This is true in the very narrow region around 100 C where the deionized water data and present process water data overlap; there is no experimental evidence that it is also true in the region of interest for a DPR.

Effect of Baking on Aluminum Corrosion

Samples of M-329 aluminum were exposed in the 314 flow loop at 100 C for periods of 15 days and 56 days after receiving various pretreatments. Samples were (1) degreased, (2) degreased and baked at 400 C for 2 hours, (3) degreased and autoclaved at 170 C for 43 hours in distilled water and (4) degreased, autoclaved and baked.

Test data revealed that the baking only slightly improved the corrosion resistance of the degreased samples and greatly reduced the corrosion resistance of the autoclaved samples.

Thermal Fatigue of Uranium

Specimens machined from normal production ingot uranium were tested in thermal fatigue in the Woodsplitter. To confine the failure to a known location on the specimen, a 75° - 0.010 inch V-notch was machined the full length of the 4-inch long, 1.336" diameter specimen. Duplicate samples were cycled to failure at thermal gradients in the uranium ranging from 225 to 575° C; the surface temp-

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erature of the uranium was about 75° C. Samples from rods quenched from the beta phase failed after 4 cycles at a thermal gradient of 575° C and after 90 cycles at a thermal gradient of 225 C.

A straight line relationship is obtained when the logarithm of the number of cycles to failure is plotted versus the core temperature. This relationship can be represented by the equation $N = Ae^{-B\Delta T}$, where A & B are constants dependent upon the specimen geometry, cycling rate, and the properties of the uranium, N is the number of cycles to failure and ΔT is the thermal gradient in the specimen. For uranium quenched from the beta phase, this equation becomes $N = 655e^{-0.0089\Delta T}$.

Annealing beta quenched uranium 24 hours in vacuo at 620 C reduces the hydrogen content from 2.45 ppm to 0.31 ppm and recrystallizes the grain structure. The changes produced by annealing reduced the resistance of the uranium to thermal fatigue. For a given thermal gradient, the number of cycles to failure was reduced by a factor of 2.8. The effect of changing the thermal gradient was not altered by annealing; the equation relating the number of cycles to failure and the thermal gradient is: $N = 242e^{-0.0089\Delta T}$.

Butt-Welded KER Process Tubes

Two 25-foot lengths of ribbed, KER size, zircaloy process tubes were successfully butt-welded together using the inert-tungsten-arc process. The procedure used for B, D, F size zircaloy process tubes⁽¹⁾ was used for the KER size tubes. Radiographic examination revealed that the butt-welded joint had complete weld penetration and that the weld contained no porosity or tungsten inclusions. The butt welded tube passed hydraulic testing using 3500 psi test pressure.

Six one-foot lengths of ribbed, KER size, zircaloy process tube were butt-welded together into a six-foot length. It is planned to flow test this length in the 1706 KE facility using 600 F, 2000 psi, demineralized water. In addition to butt-welding ribbed KER size zircaloy process tubes together, two 50-foot ribless, KER size, zircaloy tubes were welded to repair fabrication defects. Each tube had a small circumferential crack about an inch long which extended through the tube wall. Radiographic examination and pressure testing after welding indicated that the tube should be acceptable for reactor use.

Zirconium Process Tubes - H Pile Size

Three lengths of zircaloy-2 process tubing were received from Superior Tube Company. Approximate lengths of the tubing were 44'10", 46'7" and 49'.

TESTING METHODS AND EQUIPMENT

Process Fuel Element Testing

Experience in operation of the production line penetration testers at 20 mil and 25 mil reject levels has been reviewed. Because of excessive maintenance required when operated at 25 mil sensitivity, the testers have been returned to 20 mil operation. Canning process improvements resulting in greater residual can walls make it

(1) Lingafelter, Fifty-Foot Zircaloy Process Tube by Inert-Arc Butt-Welding, HW-43049, Confidential, 5-14-56.

desirable to obtain equipment capable of routine operation at the higher sensitivity as soon as possible.

The existing penetration equipment is being studied with Manufacturing personnel to effect any improvements which can make operation at 25 mil sensitivity more feasible. Two such modifications are now being evaluated in 313 Building. A vacuum tube trigger circuit has been designed to reduce the variations in trip level sensitivity in the thyatron reject alarm circuit. The second change uses photocells and relays to eliminate the frequent adjustments required for lever arm switches. The second approach is to eliminate the teflon tape used with the present sensing heads which would alleviate the maintenance and adjustment problem.

About 700 tons of metal have now been tested for the Metal Quality Test evaluation program. Very few instrument difficulties were experienced during the last month.

Equipment has been modified and provided for running Production Test 105-627-A-72MT. This test is designed to determine the relationship between total unbonded area in slugs and their behavior in pile. At present, the slug reject criterion is based on the size of any one void rather than on total void area.

I & E Fuel Element Testing

Testing Methods work with the I & E elements is aimed at development of optimum non-destructive testing techniques, and designing and providing the appropriate equipment for the Semi-Works. Meanwhile prior to operation of the Semi-Works, all I & E elements produced must be tested by the best methods available.

For the interim period before Semi-Works operation, there is a shortage of auxiliary mechanical handling equipment for the I & E tests. Construction drawings for the 306 Building automatic conveyor for I & E bond and penetration tests are 75% complete. These are scheduled for completion and transmittal to Project by August 5th. Meanwhile, early construction of a prototype of this conveyor is being expedited in Technical Shops. This prototype will be used in the laboratory to expedite final engineering of the conveyor, and for final development work of the electronic systems. It will be retained in the laboratory for future testing development.

The electronics for the internal penetration test is being evaluated. Some objectionable instrument electrical noise has been reduced with a low noise preamplifier and by saturating the power amplifier stage of the oscillator. This development study is also directly applicable to operation of the present production testers at the 25 mil reject level.

Experimental work concerned with simplifying the ultrasonic bond test by use of a two crystal probe continues to look very favorable. Better positioning devices for the transducers are being fabricated so that this technique can be optimized. Electronic circuits are being constructed so this new method can be applied in the temporary 313 installation.

A sample 0.375" diameter probe (for C pile slugs) containing both the penetration detecting coils and the ultrasonic unbond test crystals has been assembled for testing. Similar probes will be assembled for the other sizes of slugs although

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it is anticipated that there may be some difficulty in making the 0.310 probe required for the old pile I & E elements.

Methods Development

The requirements and possible techniques for automated inspection of the can, core, and assembled slug surfaces are being studied. An initial goal is the improvement and possible replacement of the several visual inspections in the present process. Experiments have begun on the use of optical photoelectric methods. This preliminary work has been confined to the outer surface of slug cans and white light illumination. The angles of incidence and reflection are being varied to define the defects that are detectable.

Development of equipment for testing irradiated slugs in the 105-C basin has continued. A Bondtester has been installed in a temporary location and is now ready for use. The grain size measuring instrument has developed some circuit faults which must be resolved before it can be used. A preliminary design has been completed of the mechanical equipment for measurement of the resonant frequencies and internal friction of irradiated slugs. The design of the electronics for these tests is about 75% complete and should be ready for fabrication cost estimates in August.

The laboratory internal friction apparatus has been modified to provide improved measurements at elevated temperatures.

IRRADIATION BEHAVIOR

Effect Of Pile Conditions On Slug Dimensional Stability

Eleven tubes of PT-105-611-A, a test to establish the effect of pile conditions on slug dimensional stability, have been discharged at 500 MWD/T.

Preliminary analysis of the diameter changes resulting from the irradiation show a significant correlation with position in the tube (exposure). Considering the data from seven of these tubes which were exposed at B pile, high specific power (central zone in tube) slugs grew eleven mils on the average, while slugs at the ends of the tube grew an average 6 mils. Diameter changes for slugs from four tubes irradiated at 105-C show a similar relationship with position in the tube except that the C pile slugs grew on the average 7 mils less in a given position than the slugs at B.

Eighteen tubes of this test are still being irradiated. Discharge exposures are set at 900 and 1100 MWD/T.

Cored Slugs

In the old piles, about 50 stuck charges have occurred in cored slugs since the first of the year as compared to 2 in solid slugs. This greater tendency of the cored slugs to stick at discharge is due to a combination of warping and increase in diameter. On the average the diameter of cored slugs exposed to 300 MWD/T increases 12 mils (generally resulting from internal splitting) which reduces the warp necessary for stuck charges from 80 mils, as in the case with solids, to 68 mils. Comparing the probability of a cored slug warping 68 mils to the probability

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of a solid slug warping 80 mils we would expect about 12 times as many cored slug stuck charges as solids. Actually the cored slug stuck charge rate is about three times the expected rate. Considering drilled cored slugs, 63% of the stuck charges occurred with recovered metal designated as DZ lots. Slugs from DZ lots are to be measured to determine if they warp and/or increase in diameter to a greater extent than virgin cored slugs (D lots) on which the theoretical rates were based.

In addition to the above, three stuck charges occurred in tubes of PT-588, comparison of extruded and drilled cored slugs. It has not been determined which type of slug was responsible for the sticking. The remaining eleven tubes of PT-588 were discharged below goal (600 - 750 MWD/T) which completes the irradiation of metal under this test.

A final report is being prepared on the irradiation behavior of cored slugs with crimped uranium end plugs (PT-105-603-A). The data indicate that the cored slugs with crimped plugs are inferior to cored slugs with welded uranium plugs or aluminum plugs. Measurements from three tubes of slugs irradiated from 400 - 600 MWD/T in C Pile showed 10% more cored slugs with crimped plugs internally split than normally observed with regular cored slugs at similar pile conditions.

Three failures were sustained in fifty tubes of these slugs lot charged at 105-B. This results in a failure rate for the crimped slugs which is 2.2 times the rate observed with regular cored slugs. This difference in rupture rates observed is significant at the .80 confidence level.

Optimum Length of Cored Slugs

A production test has been designed to indicate optimum length of cored slugs. Lengths tested will be 4", 6" and 8". Relative rupture resistance will be determined by a run-to-rupture test. Four tubes of each type will be charged. Two ruptures will be taken in each type unless one of the three types proves superior without incurring two failures.

FACILITIES AND EQUIPMENT DEVELOPMENT

Autoclaves

The new high temperature autoclaves in 314 are installed and are now being tested. Some problems with leaks and temperature gradients remain. The autoclaves should be on stream by the end of July.

The new stainless steel autoclave in 100-K Area is starting its shakedown run.

The older autoclaves are running on a routine basis, with tests up to one year at 350 C half completed.

The No. 1 autoclave in 326 Building is equipped with a duplex pump, which permits use of deionized water, 300 Area process water, or mixtures in any ratio. A mixture of 2 parts deionized water to 1 part 300 Area process water is very satisfactory for tests at 120 C. This autoclave is also equipped with electrical leads, useful in galvanic experiments.

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Induction Preheating of Canning Sleeves

A proposed method for increasing the production rate of the Al-Si canning furnaces (by shortening the canning cycle) is to preheat the can-sleeve assemblies by induction prior to submerging in the canning bath. Investigation to determine the optimum frequency in the range of 60-3000 cps for induction preheating can-sleeve assemblies is in progress. A request for negotiation of a development contract with an off-site vendor to conduct the development work on 60 cps can-sleeve assembly preheating is currently underway. On-site development work will be performed on the 200 kw, 3000 CPS, Tocco induction heating unit in 314 Building. The necessary test equipment has been installed and coil balancing operations started. The initial tests will establish permissible heating rates, can and sleeve temperature gradients, and the scope of the mechanical design required for a production installation.

Facing Operation

Experimental facing operations on I and E fuel elements have been continued on the turret lathe in 314 Building. The object of this work is to provide proper tooling for facing and tru-lining I and E fuel elements produced in the semi-works. Additional tooling will be provided for the Acme-Gridley automatic turret lathes so that preliminary runs can be made on those lathes during periods of I and E canning in 313 Building (the latter part of this year). Results of tests based on power measurements during cutting and surface finish measurements on the as-machined pieces show that the most satisfactory cutting tools are carbide tool bits with a 60° relief angle. The power measurements also showed that coolant use during the cutting operation would be of marginal benefit.

Project CG-676 - Fuel Element Semi-Works

A revision to the Project Proposal requesting authorization for construction funds was approved by AEC on July 19, 1956. Design work was estimated to be 89% complete at the end of July. Total Funds \$400,000.

Project CA-546 - Fuel Element Pilot Plant

Anodizing, plating, cleaning and pickling equipment was tested and completed during the month. The swaging enclosure was also installed and tested. Only minor clean-up and start-up items remain to be done as a part of this project. Total Funds \$1,600,000.

Project CG-620 - Vacuum Melting Furnace

Three bid proposals were received for the vacuum furnace. The proposals are being studied with special attention to the need for centrifugal casting and a possible relocation of the installation from 314 Building to the 306 Building. Total Funds \$143,000.

Project CG-664 - 350° C Flow Loop

Design work on this project was estimated to be 50% complete on July 31, 1956. A request for bid proposals for a "package" unit is scheduled for issue in September. Total Funds \$120,000.

Project CG-680 - Corrosion Testing Facilities - Bldg. 314

The project proposal for this work is awaiting approval by the Washington office of the Commission. Authorization will be from the '57 budget. Total Funds \$140,000.

Miscellaneous Facilities

Installation of partition in the 306 Building second floor office space was completed on a lump sum contract during July. New metal furniture was installed, the ventilation system tested, and the space is now ready for occupancy.

Services

The Special Metals Finishing Laboratory operated on a one shift basis during the month with no premium time worked.

Normal uranium inventory status as of July 1 (tons)

<u>Received</u>	<u>Disbursed</u>	<u>Increment</u>	<u>Balance</u>
11.16	25.16	-13.56	96.84

105-C Metal Examination Facility

Modifications and revisions of the Basin IV operating equipment are essentially completed. Revisions to the following components have been completed. Testing and calibrating is in process.

Dejacketer Crane - Damage was sustained to the dollies each time the dejacketer crane deposited the slug cartridges upon them. The dejacketer crane controls were revised by installing a Meletron pressure switch to control a solenoid valve for both the downward and upward piston travel. Any pressure increase causes the pressure switch to stop the water flow, thereby eliminating the possibility of mechanically damaging the dollies.

Slug Surface Camera - This automatic sequence camera required changes in the film holding plate to permit adjustments so that a serial number would be placed on each negative. Extension of the plate with slots for making the necessary length adjustments has been completed.

Ultrasonic Test Equipment - The sonobond crystal to determine unbond areas of irradiated slugs has been installed. Presently the six crystals for grain size determination and the sonobond crystal are being calibrated.

Slug Fracturer - Fracture tests revealed that the hydraulic system for the fracturer cylinder will require modifications. Surging of the hydraulic system caused erratic results on the force-deflection recording chart. A different type check valve is being installed in the line to eliminate this surge problem. A surge tank will be installed in the event the check valve fails to eliminate the surge.

Cross-Section Camera - The focusing mechanism to adjust the focal length of the camera lens has been installed and the lens tubes have been reinstalled in Basin IV.

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PHYSICS RESEARCH SUB-SECTION

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Reactor Lattice Physics

Lattice Testing Reactor

The lattice testing reactor has been used to obtain values of k_{∞} in several lattices. The results together with comparable results from exponential pile data⁽¹⁾ are shown below:

	k_{∞} (LTR)	k_{∞} (exponential)
7 1/2" dry	1.056 ± .003	1.055
8 3/8" dry	1.067 ± .003	1.068
8 3/8" wet	1.046 ± .003	1.047

These measurements were made with H-pile type process tubes. The excellent agreement between the k_{∞} values from LTR and exponential experiments should be regarded as somewhat fortuitous because a) the graphite densities and purities in the two experiments were not necessarily the same and b) the exponential value of k_{∞} depends on a calculation of the migration area.

Buckling Calculations

In line with the present IPR studies, calculations were made to determine the reactivity available in a diphenyl cooled, graphite-uranium reactor and a graphite-uranium oxide fueled reactor with air, light water, heavy water, and diphenyl as the reactor coolant.

1. Natural Uranium Metallic Fuel Element with Diphenyl Coolant

Bucklings have been calculated by the method presented in HW-35038 for a 1.36" diameter natural uranium metallic fuel element in a series of graphite lattices with the organic diphenyl as the coolant. Calculations were made with both aluminum and magnesium can and process tube material. The 76 mil thick coolant annulus contained 2.33 g/cm². The calculated bucklings are presented in the table below:

Lattices (inches)	Al can and Tube Material Bucklings x 10 ⁶ cm ⁻²		Mg. Can and Tube Material Buckling x 10 ⁶ cm ⁻²	
	Diphenyl	Air	Diphenyl	Air
6 3/16	25.0	1.0	62.1	35.1
7 1/2	93.4	100.7	126.3	131.8
8 3/8	98.	115.8	128.7	144.4

2. Natural Uranium Oxide Fuel Elements with Various Coolants

Bucklings have been calculated by the method presented in HW-35038 for a 1.86" diameter natural uranium oxide fuel element in a series of graphite lattices with various coolants. The amount of uranium in this oxide fuel element is equal to that in a 1.36" diameter metallic fuel element. The coolants were: air, light water, heavy water, and diphenyl. The 58 mil thick coolant annulus contained 2.33 cm³ of coolant per centimeter length of fuel. The results of these calculations are given in the table below:

- (1) Clayton, E. D., Exponential Pile Measurements in Graphite-Uranium Lattices, AECD-3677.

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Lattice (inches)	Bucklings $\times 10^6 \text{ cm}^{-2}$				
	Air	H ₂ O	D ₂ O	Diphenyl	
6	- 288.8	- 194.4	- 257.6	- 219.0	
7	- 86.4	- 55.9	- 69.1	- 61.9	
8	8.8	8.3	18.5	12.5	
9	47.5	30.9	52.7	40.8	
10	55.2	29.9	57.4	42.9	
11	45.6	16.0	46.1	30.5	
12	26.9	- 4.6	26.2	10.4	

The buckling values for the oxide fuel element are somewhat lower than those for a metallic fuel element that has the same number of uranium atoms per unit length of fuel. Since the density of an oxide element is slightly greater than one-half that of the metallic fuel elements, the fast effect for an oxide must be less than the fast effect for a metallic fuel element that contains an equal amount of uranium. It has been determined that the "effective resonance integral" for an oxide fuel element is greater than that for the metallic fuel elements. This is due to the additional scattering of neutrons into the resonance bands by the oxide which does not exist for metallic uranium. This results in a decrease in the resonance escape probability. Little change can be expected in the thermal utilization and the value of η .

High Temperature Exponential Experiment

The necessary heating elements for the high temperature experiment have been received and positioned in the 7 1/2" lattice exponential pile. Control and monitor thermal couples have been installed. Aluminum foil and magnesium insulation are currently being placed on the pile. In the high temperature exponential experiment the pile will be heated up to 300° C, and the buckling measured as a function of the temperature.

Cluster Rod Lattices

The buckling has been determined for a cluster of seven 0.925" natural uranium slugs in a 10 3/8" lattice. The seven rod cluster was contained in an aluminum process tube of 3/02" inside diameter. The exponential pile (~5' x 8' x 6') contained 40 process tubes. A value of $13.3 \times 10^{-6} \text{ cm}^{-2}$ was obtained for the dry lattice. The C/U atom ratio for the seven-rod cluster is 37.2 and the Al/U ratio is 0.449.

Heavy Water

Five hundred pounds of heavy water (D₂O) were received from Savannah River. This heavy water is to be used in experiments to investigate the effect on the reactivity of a graphite lattice when D₂O is used as the coolant, and also for moderator control studies using D₂O as the control in an undermoderated lattice.

Enriched Uranium Graphite Lattices

During July measurements were conducted in the small (~4' x 4') graphite exponential pile with uranium of two different enrichments, 1.007% by weight U²³⁵, and 0.94% by weight U²³⁵. Two slug sizes were used with the 1.007% enriched uranium. The results for these are given below:

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Lattice SpacingDry LatticeLattice

(Slug Diameter 0.925")

8 3/8"

Al/UC/UBuckling
(10^{-6} cm^{-2})H₂O/UBuckling

0.69

186.8

0.174

224

(Hollow Slug, 1.66" O.D.,
0.94" I.D.)

8 3/8"

10 3/8"

0.25

80

380

0.25

124.3

335

0.180

326

0.21

124.3

332

0.279

331

The ratios listed in the table are the atom ratios for the cell. The measurements with the 1.007% enriched uranium are part of a series designed to yield information on the reactivity of lattices which use enrichment. Buckling values for the hollow slug are being determined for the core partially filled with water ($H_2O/U = 0.18$) and for the core filled ($H_2O/U = 0.279$). Small aluminum tubes, of two different sizes, were used to contain the water in the core of the hollow slug. The buckling variation for different amounts of water in the core is of interest since partially filled tubes could result if boiling were to take place in a hollow internally cooled fuel element.

The 0.94% enriched uranium was obtained for investigating possible E-N loadings for tritium production. Thus far two lattice spacings have been measured with the enriched slugs.

The buckling is to be determined for several different ratios of N material to E material for different lattices in an effort to determine the most favorable, or practical ratio for possible pile loadings in the Hanford reactors. The results of measurements to date, which so far are for the enriched uranium only, are listed below:

<u>Lattice Spacing</u>	<u>Al/U</u>	<u>C/U</u>	<u>Buckling</u> (10^{-6} cm^{-2})
(Slug Diameter 1.34")			
6 3/16"	0.61	47.2	286
8 3/8"	0.61	89.1	320

Enriched Uranium Water Moderated Lattices

The Exponential Pile laboratory has resumed the program of measuring lattices of enriched uranium in ordinary water. These water-uranium experiments are being performed primarily to obtain data upon which to base nuclear safety specifications concerning the safe handling and storage of enriched fuel elements, and also to provide additional data upon which to base a correlation of experiment and theory for water moderated lattices. The present series of bucklings were measured using solid slugs of diameter 1.336" and of enrichment 1.44% by weight U^{235} . A total of 49 tubes (four eight-inch slugs/tube) were used in the lattice assembly. The slugs were positioned in type 3-S aluminum tubes which had an I.D. of 1.40" and a wall thickness of 49 mils. These were the same tubes as used in earlier measurements for the 1.37" O.D., 0.48" I.D. hollow slug. The buckling values are listed in the following table:

<u>Lattice Spacing</u> (hexagonal Geometry)	<u>H₂O/U</u> (by volume)	<u>Reflector Savings</u> (Assumed)*	<u>Buckling</u> (10 ⁻⁶ cm ⁻²)
2.0"	1.21	7.72 cm.	5294
2.1"	1.46	7.45	5677
2.2"	1.73	7.25	5774
2.4"	2.30	6.95	5115
2.6"	2.92	6.72	3818

* The reflector savings were assumed from Brookhaven data on water-moderated uranium lattices.

From the measured values the maximum buckling is estimated to be $5800 \times 10^{-6} \text{ cm}^{-2}$, which occurs at a H₂O/U volume ratio of 1.65. If $500 \times 10^{-6} \text{ cm}^{-2}$ are added to this value to correct for the poison effect of the 3-S aluminum tubing then the maximum becomes $6300 \times 10^{-6} \text{ cm}^{-2}$.

In each of the above lattices the relaxation length was measured with the 49 tubes in two different configurations; one had the tubes in the outer hexagon positioned as close to the center as possible, and the other was loaded to represent pictorially a better cylinder. The results of these measurements indicate that the highest buckling is not always obtained with the "better cylinder" but depends on the H₂O/U ratio of the lattice. The highest maximum buckling is, however, obtained with the "better cylinder."

Multi-Region P₃ Solution

A solution for the relative neutron flux in regions of cylindrical geometry by the P₃ approximation to the transport equation has been programmed on the 702 digital computer. The P₃ approximation utilized in the program is very similar to that presented by R. R. Malfner in DP-102. The neutron flux can be computed for a geometry of several different regions up to a maximum of five. The 702 will calculate the average flux and the arbitrary coefficients in the neutron flux equation for each region. This will permit a calculation of the neutron flux for the cylindrical geometry desired.

The input data needed for this program are the macroscopic scattering and absorption cross sections for thermal neutrons in each region, the radial distance from the center of inner most region to the boundaries between the regions, and the relative thermal neutron source strength of each region. There is a restriction on the calculation which requires that the scattering and absorption cross section of the outer most region can not be equal to zero. It is certainly unforeseeable that such a case will ever be necessary.

Minimum Reactor Mass and Flat Flux

A theorem in reactor physics due to G. Goertzel states that the minimum critical mass is achieved with a spatial distribution of fissionable material such that the flux is constant at all points in the space occupied by the fissionable material. The condition of flat flux is highly desirable in a power reactor. The theorem has so far been applied only to pure fissionable isotopes in water systems. It is now being extended to graphite-natural uranium systems for possible application to Hanford designs.

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DECLASSIFIEDNeutron Age in Water

The age of neutrons in a proton gas has been calculated (Proton density assumed to be the same as in water) from starting energies of 1, 2.5, and 14.1 m.e.v. to indium resonance. The results are 23.4, 50.6, 477.8 cm² respectively. Additional energy points are now being secured to permit averaging over the fission neutron spectrum. Preliminary results indicate that oxygen accounts for about 18 cm² in the age in water. This is in agreement with results obtained at KAPL.

Experimental Nuclear PhysicsNeutron Spectrometer Facilities

Equipment for automatic operation of the 105-DR neutron spectrometer was placed into operation during this month. This equipment allows more optimum use of the neutron spectrometer by continuously obtaining data without an attending operator. The desired experimental sequence is programmed into the control chassis of the unit. At the end of each data collection period in the sequence an electric typewriter automatically prints out the neutron spectrometer settings and the number of counts recorded on each of four scalars which are part of the unit.

The equipment has been used during a portion of the month for measurement of the plutonium-240 low energy neutron fission cross section. A preliminary analysis of the data indicates that it is in agreement with the plutonium-240 fission cross section which was obtained before installation of the automatic equipment. The use of this equipment has allowed an improvement in the statistical precision of the data and a significant increase in the number of neutron energy points obtained.

Experimental Reactor OperationsLattice Testing Reactor

The Lattice Testing Reactor operation proceeded routinely during the month. There were no unscheduled shutdowns. Experiments included numerous foil irradiations and reactivity measurements in the 8-3/8 inch lattice with C-pile tubes, both wet and dry, and with solid and I and E slugs. Two irradiations were made for Physics Development Unit personnel, one with an E-N load and one with 1.68" diameter uranium pieces in 2-1/8" tubes. The lattices were respectively 8-3/8" and 7-1/2".

No major maintenance was required. One vertical safety disk was replaced after copper plating the contact surface. Some trouble was experienced retrieving the disk but was cured by slight polishing of the surface. Erratic behavior of the log amplifier and period trip unit was apparently cured by replacing the mercury cells and polishing the cable connectors.

Thermal Testing Reactor

All instruments and mechanical equipment have been installed and tested. The startup procedures have been reviewed and approved and actual loading is planned for the first week of August.

Temperature Coefficient Experiment

The Plutonium Metallurgy Unit has successfully made the first pour of three 7-1/2" synthetic 1000 MWD slugs. Rapid progress in completing the slugs is expected, provided analytical data show good distribution of plutonium in the slugs.

Nuclear Safety Problems

Specifications for handling, storing, and shipping of Oralloid (1.6%) have been prepared for use at Hanford. These are based on exponential experiments conducted by the Physics group and described earlier in this report.

New specifications for shipping product plutonium offsite have been set up and transmitted to the AEC, Hanford.

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METALLURGY RESEARCH SUB-SECTION

Fundamental Studies

Since the interpretation of the effect of irradiation on the microstructure of uranium is extremely complex, various laboratory studies are being conducted on non-irradiated uranium in order to establish deformation and fracture norms under a variety of test conditions and for various uranium histories. Experiments are now in progress on the fractographic appearance of beta heat-treated uranium of different grain sizes and different preferred orientations. These specimens, both notched and unnotched, were cooled to -185 C and fractured by an impact. Subsequent optical and electron microscope examination revealed: (1) brittle fracture of a type characterized by separation of platelets and development of planar facets, the flat sides of which show twins and microcracks, (2) very large reentrant macro cracks and voids near the main fracture area, (3) appreciable ductility of these specimens under the impact test conditions, evidenced by bending of the 1/8" diameter specimens. Deformation and fracture studies at elevated temperatures will be conducted in an evacuable hot stage enclosure which is currently being tested and calibrated.

The ex-pile diffusion of uranium/AlSi and uranium/zirconium is being investigated to provide a basis for interpreting in-pile studies currently in progress. Two U/AlSi couples, annealed for 356 hours at 200 C (392 F) and 305 C (581 F) showed the maximum penetration of uranium into AlSi to be 0.0005 inch and 0.007 inch, respectively; the maximum extent of diffusion of AlSi into the uranium was 0.0003 inch in the 200 C couple and 0.0041 inch in the 305 C couple. Six uranium/AlSi couples are now being annealed at 200 C. The metallographic examination of two irradiated uranium/aluminum couples which had developed large voids between the uranium and aluminum failed to produce any diffusion parameters. However, an x-ray examination of a sample scraped from the diffusion interface showed that UAl_3 was definitely present.

Erratic results from an experiment to evaluate the degree of surface cold work imparted to irradiated uranium by metallographic preparation has been traced to significant crystallographic variations from point to point in the sample. X-ray traverses along a diameter of a wafer cut from a slug irradiated to 520 MWD/T have shown variations of two or three-fold in peak intensity of several lines. The traverses suggest very large "grains" or "domains" of preferential crystallographic orientation. Existing double crystal x-ray equipment is not sufficiently sensitive nor can it view a sufficiently small area to give a critical analysis of these "grains".

Study of noble gas diffusion in silver continued with the preparation of five silver-xenon sandwiches. Gas samples were taken during annealing at 500, 600, 700, 735, and 800 C. Two sets of the gas samples were irradiated unsuccessfully; the other three are awaiting irradiation and analysis. Although the samples were lost, it was shown that xenon diffuses through silver.

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Metallurgy Research Sub-Section

Mechanical and Physical Properties of Fissionable Material

Samples were obtained from tensile samples irradiated at HAP0 under PT-105-3NA to estimated exposures of 150, 300, and 620 MWD/T and sent to the Analytical Laboratory for U-235 burnup analysis. Results on the one sample agreed closely with the calculated exposure.

Reactor Structural Materials

Study of several variables which accelerate sorption of hydrogen by zirconium, Zircaloy-2, and Zircaloy-3A has continued. Metallographic examination of the exposed samples, which is 50 percent complete, promises to be a convenient and rapid analytical method for hydrogen in zirconium once it has been calibrated against vacuum extraction methods. Some of the trends that are apparent from the incomplete data are: (1) zirconium, but not the alloys, picks up more hydrogen in a given time in steam at 400 C than it does at 500 or 600 C; (2) the addition of hydrogen to the steam reduces hydrogen sorption by the zirconium; and (3) addition of hydrogen to Zircaloy-3A depresses the alpha-beta transition temperature to less than 725 C (the transition temperature for pure zirconium is 852 C).

Fuel Materials

A laboratory is being equipped for the study of fabrication variables of ceramic fuel materials. A Loomis 25-ton ceramics extrusion press has been received. Lucite patterns were completed for making plaster-of-Paris molds for slip casting UO_2 into 1/2" x 8" rods, 1" x 1/4" x 7" bars, and a "pie" section fuel rod. A hardened steel die for cold pressing 1/2" x 1/4" x 4" UO_2 bars was completed. A plastic extrusion die pattern has been constructed for experiments to determine the feasibility of casting plastic extrusion die nozzles for short service life use in the ceramics extrusion press. This technique, it is hoped, will help to establish optimum extrusion die designs for non-symmetrical shapes at minimum cost and time. A trip report, HW-44693, covering the sixth UO_2 panel meeting at WAPD has been prepared.

Fuel Element Evaluation

In past MTR experiments, power generation in the HAP0 Fuel Element Testing Facility has been estimated by various methods. Power generations calculated from known flux, facility inlet and outlet temperature, basket inlet and outlet temperature, and from core temperatures and uranium burnup have differed significantly. Experiment GEH-4-12 was designed to obtain maximum core temperature and power output by means of improved core and basket inlet-outlet thermocouples. The experimental fuel elements were two cored natural uranium slugs canned in 2S aluminum by mechanical cold closure technique. One slug was insulated and contained large grained uranium. One slug was uninsulated and contained a thermocouple in its core. After assembly of the experiment at the MTR and installation in the reactor, all thermocouples had correct resistance and circuitry. At startup and at 4 MW the temperatures were approximately as anticipated. At full MTR power, 40 MW, the core temperature was an indicated 1200 F, much lower than the calculated 1470 F. Inlet temperature read 97 F. Outlet thermocouples read 110 F and 180 F, and were erratic. After

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30 hours' operation, the slug core thermocouple failed. Prior to shutdown on July 23, 1956, the indicated inlet temperature was 92 F, outlet temperatures 104 F and 152 F. Using averaged outlet temperatures, the power output was calculated to be 100 kw/ft. Reliable power measurements were not obtained. The cause of the erratic thermocouple behavior is not yet known.

Examination has been started on two insulated cored slugs (GEH-4-11) which were received from the MTR in June. One of the slugs contained a thermocouple in the core, used to determine a maximum core temperature of 938 C during irradiation. The second slug was a large grained uranium slug. The post-irradiation diameters of both slugs were approximately 1% larger than the unirradiated values. After measuring, the slugs were uncanned and it was observed that the end of the core in the thermocouple slug had been plugged by material which had melted and run down from the core wall. A dark area was observed on the outer surface of the uranium about the middle of the slug. The diameter in this region was approximately eight mils less than the pre-irradiation diameter while the end diameters were three mils larger than the pre-irradiation values. The slug had decreased in length a maximum of forty mils. The core of the large grained uranium slug was not plugged.

The numerical stability problems associated with a time dependent solution for the thermal stresses in fuel elements have made it necessary to investigate step by step the viscoelastic solutions in which the viscoelastic constants are changed with each increment. The use of such a mathematical model suggests evaluating the material model in terms of behavior which will satisfy the conditions of an irreversible thermodynamic process. Thus, an investigation of the thermodynamic basis of viscoelastic behavior has been started in the hope of finding experimental procedures which can be used to evaluate laws of material behavior. Though damping experiments are and will be conducted for uranium, at this time the method of evaluating needed thermodynamic functions with these tests has not been found by this investigator. Stress relaxation experiments could be used to determine thermodynamic functions for isothermal problems. The generalization of this procedure to varying temperatures, which occur during pile startup, is not understood. The use of experimental results from isothermal creep tests is also possible. (Creep results can be analyzed with ease by using a Kelvin Model while relaxation test results can be interpreted with a Maxwell Body.) The procedure for using arbitrary combinations of these bodies is not clear. Furthermore, it is not yet clear which arbitrary combination is suggested by the experimental results. Future work will be directed along the lines of analyzing experimental results in terms of thermodynamic behavior and of the use of viscoelastic solutions with varying material constants for the thermal stress problems.

A specimen for rupture testing of Zircaloy-clad natural uranium was completed. The objective is to observe the effect of Zircaloy cladding on the oxide formation and erosion of uranium. The Zircaloy cladding is purposely defected with a 0.031" diameter hole. The specimen will be heated to 400 C (uranium surface temperature) and exposed to 316 C water.

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Metallurgy Research Sub-Section

Preliminary calculations by Experimental Physics personnel on the nuclear effects of substituting 0.007 inch 304 stainless steel for conventional aluminum cladding on Hanford size 4" slugs indicate that the stainless steel is about three times as poisonous with respect to thermal neutrons as is the aluminum. This poison effect may be overcome by the use of an additional 0.02% U-235 enrichment in the fuel.

Radiometallurgy Examination

The examination of six unruptured, standard production slugs to determine the relation between core distortion and bonding in normal slugs and incipient cap failures continued. Two normal-appearing (i.e., not exhibiting "necked" regions in the jacket) have been sectioned longitudinally at the cap and base ends, and the length and dish of the uranium cores measured. These measurements are summarized in Table I.

TABLE I. Length and Dish Measurements

Slug No.	Tube	Exposure, MWD/T	Dish, mils		Average Length Change, mils	
			Cap	Base	Axis	Periphery
H-314	3288-H	795	12	0	--	--
5,301	3288-H	795	6	15	-146	-125

The caps and bases of both slugs were found to be slightly unbonded; however, there were no wide gaps between the uranium and aluminum except at the corner radius of the cap end of slug 5,301. Four of the six slugs have now been examined, and the results obtained thus far indicate that there is no relationship between core dishing and "necking" of the aluminum jacket.

Examination and sampling of selected slugs from Run V, Bluenose irradiation, continued during the month. This examination has been undertaken to obtain a correlation between the fission product distributions measured by chemical methods and scintillation scanning methods. Two 0.004-inch thick samples were successfully removed from the end of a 1/4 inch square transverse bar from slug 34 from the front face of the pile and submitted to the Analytical Laboratory. These samples were removed by grinding material from the end of the uranium bar with a suspension of silicon carbide in a volatile liquid. Ethyl alcohol and petroleum ether, containing a suspension of silicon carbide, were used for the initial grinding operations. However, evaporation of these solvents resulted in an oily residue which remained on the sample and the grit to complicate the uranium extraction. Carbon tetrachloride was tried as an alternate vehicle and successfully evaporated.

Separations Plant Structural Materials

For some time it has been the opinion of this laboratory and other workers in the field of corrosion that type 304L stainless steel would prove to be as resistant to intergranular corrosion as type 347 stainless steel in extended service at the sensitizing temperature of 677 C. The theorized mechanism to

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Metallurgy Research Sub-Section

account for this is the agglomeration of the precipitated carbides after extended time at the sensitizing temperature. This would result in a discontinuous carbide path at the grain boundaries and corrosion resistance approximating the annealed condition, providing that the carbon content were low enough. In order to investigate this hypothesis, samples of type 304L stainless steel were held at a temperature of 677 C, in an inert atmosphere, for times ranging from 15 minutes to 1000 hours. Each sample was water quenched as it was removed from the furnace. The samples were immersed in boiling 65 w/o nitric acid and solution changes and weight loss measurements were performed every 48 hours. At the present time the samples have been exposed to the acid for a total of 480 hours. The corrosion rates began at 0.0025 ipm for the 15-minute sample, increased to a maximum of 0.0140 ipm for the 16-hour sample, and then decreased to 0.0016 ipm for all the samples which were held at temperature of 250 hours or more. Extensive metallographic examination will be necessary before a definite statement can be made; however, the pattern of the corrosion rates corresponds quite well with that which would be predicted on the basis of the hypothesis.

Samples of Haynes "Stellite" alloys 6-B and 6-K were submitted for evaluation as bearing material for submerged pumps in nitric acid service. The two alloys were started in the Huey test: five 48-hour periods in boiling 65 w/o nitric acid. By the end of the second 48-hour period, both alloys were corroding at rates of about 0.1 ipm. They were removed from the test at this time and are considered unsatisfactory for service in nitric acid in high concentrations.

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Fifteen, eight-inch, plutonium-containing PCTR slugs were cast and twelve of these have passed radiographic inspection, the remaining three have not yet been radiographed. These fuel elements were cast in the high vacuum induction melting furnace and the yield of acceptable castings indicates that satisfactory mold designs and casting techniques have been developed.

Pu-Al foil containing 3.9 w/o plutonium has been rolled from cast ingots and a strip of this foil has been drawn down into wire of two sizes. A number of discs, 1/2 to two inches in diameter, have been punched from the foil. Billets have been cast containing 0.39 w/o plutonium and will be used to fabricate foil discs and wire pins of this composition. A die has been fabricated to cup pins from the wire.

Delta plutonium foil of 6.5-mil thickness has been rolled for Pile Physics Unit. Discs, 7/8" diameter, must be cut and coated with nickel to complete this work.

The impact testing hood has been sealed and accepted from Minor Construction. It had a leak rate of 1 cu ft/hr. The 30-inch Kodak optical comparator has been received and located in the laboratory. Considerable effort has gone into the planning of the modifications of the 231 Building to accommodate new equipment and facilities for the enlarged program for the coming year. Preliminary scope drawings have been prepared for use by the Project Section.

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DECLASSIFIEDCONTACT ENGINEERING UNITPROJECT ACTIVITIESProject CA-512

A new Work Authority for Project CA-512 has been received from the Commission. This Work Authority supersedes all previous Authorities and itemizes the remaining work to be performed in the "K" Area, including items requested in Revision 5 to the Project Proposal CA-512. The completion date of Feb. 28, 1957 has been agreed upon for the remaining work.

Construction on the KER Facility is 96% complete.

Project CA-548 (New Rod Tower)

By letters dated June 27, 1956 and July 3, 1956, the Commission was requested to supply a new directive and Work Authority to the Company for this project, based on recommended minor design changes, methods of accomplishing the work, allocation of funds and rescheduling. In the recommendation, the Company expenditure was listed as \$10,554 instead of \$16,500 as previously authorized.

Project CG-558

Construction is reported to be 66% and 37% complete for Phase I and II, respectively.

Further cavitation tests were run on one of the 190-B pumps after the impeller had been modified. There was still evidence of cavitation, although less severe than previously. Further tests will be run on the impeller, which was modified by the vendor, when it is received.

The first major outage, for tie-in of the new 558 pumping plant, is now scheduled at "B" Area on September 24, 1956.

Project CG-654

Design criteria for inclusion in the scope package continue to be reviewed, commented upon and approved in revised form. Reactor Design & Development Unit reports that this phase is approximately 45% complete. Several of the design criteria require development testing to assure the performance of proposed design. Such development tests have been instituted. At present it appears that the development test program may extend approximately two years.

ETR Liaison and Project CG-681

The design of the Hanford facilities in the ETR has been started by the Design Engineering Sub-Section. It has been requested that every effort possible be made to have the Construction Project Proposal ready for submission to the Commission by November 1. The Commission has deleted this item from the FY 1958 construction budget and placed it in the FY 1957 equipment budget. A "Users" meeting was held at Idaho Falls on July 18 and 19 to discuss mutual problems which have arisen in the early stages of experiment design. The biggest problems now facing all the users seem to be gamma heating, irradiation damage, and the most desirable operating level. Cooperative programs are being formulated to overcome these problems.

MTR Liaison

Following is a summary of the work performed on the GEH programs during the month of July:

GEH-3

The following test proposal was written requesting an irradiation in the MTR:

GEH-3-19, Fit Tolerance Test for Fuel Material, HW-44707, R. Neidner,
July 30.

GEH-3-19 was charged July 2 and is being irradiated during MTR cycle #73; GEH-3-20, High Temperature Uranium Tensile Sample, was charged and irradiated during cycle #72 and was discharged July 23. The test sample is presently awaiting return to HAPO early in August.

Experiments still undergoing irradiation in the MTR are GEH-3-8, Matrix slugs; GEH-3-12, Thorium-Uranium Alloy Fuel Material; GEH-3-17, Thorium-Uranium Alloy Fuel Material; GEH-3-18, Power Metallurgy, U-Mag Fuel Material.

GEH-4

The following test proposal was written requesting approval of an I & E slug experiment:

GEH-4-14, Internally and Externally Cooled Wafer Fuel Elements,
HW-44737

GEH-4-14 is a supplement for GEH-4-8 which was discharged at the end of cycle #71, July 2. GEH-4-8 was unsuccessful from a power data standpoint because of improper functioning of the thermocouples. GEH-4-14 is scheduled for irradiation during cycle #75, September 3. This irradiation will last for three consecutive cycles (9 weeks). GEH-4-12, consisting of two cored and unbonded test slugs, were irradiated during cycle #72, July 2-23. Both GEH-4-8 and 12 are awaiting return to Hanford early in August.

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GEH-4-13, consisting of two cored and bonded test slugs, was charged July 23 and was prematurely discharged July 30 because of severe leaking of the in-pile piping. For MTR reasons, other than the 4-13 difficulty, no irradiations are planned in the GEH-4 loop between August 13 and September 3.

Radioactive Material Shipments

One radioactive material shipment was received during the interim of this report. This shipment arrived from the MTR June 28 and consisted of: two capsules from GEH-3-10, one capsule from GEH-3-12, two capsules from GEH-3-18, and two slugs from GEH-4-11. There was a total of approximately 8000 curies involved in this shipment. Arrangements have also been made for another shipment before the middle of August. This next shipment will involve approximately 9000 curies.

SPECIAL STUDIES

Economic analyses have been reviewed for charge-discharge justification, cobalt production, and J reactor production. The costs associated with several jacketing materials for cluster elements is being considered.

FILE TECHNOLOGY SECTIONINVENTIONS

All File 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 July 1956 except as listed below. Such persons further advise that, for the period therein covered by this report, notebook records, if any, kept in the course of their work have been examined for possible inventions or discoveries.

<u>Inventors</u>	<u>Title</u>
T. C. Nelson	A Cyclic Load Programming Device for Use on Mechanical Testing Equipment or Universal Testing Machine
D. H. Curtiss W. C. Riley	Process for Making Graphite of a Precisely Specified Electrical Resistivity
W. C. Riley	The Preparation of a Radiation Stable Graphite
W. C. Riley	The Preparation of a High Density Graphite
D. H. Curtiss W. C. Riley	A Process for Making Graphite with a Controlled Coefficient of Thermal Conductivity
D. H. Curtiss W. C. Riley	Process for Making Graphite of a Specified Thermal Conductivity
D. H. Curtiss W. C. Riley H. A. Fowler	Process for Making Graphite with a Precisely Specified Density

Acting Manager - File Technology

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VISITORS AND BUSINESS TRIPS

V. R. Thayer of the duPont Co., Wilmington, Delaware visited Hanford on 7-12-56 to discuss 234-5 development problems, Purex processing problems and toured the Purex Plant.

E. W. Rebol of the GE ANP Dept., Cincinnati, Ohio visited Hanford on 7-30-56 to discuss HAPO analytical assistance to ANP.

RC Dalzell, AEC, Reactor Division, Washington, D. C. visited Hanford on 7-18-56 to discuss fuel processing.

PW Howe, of the Glen L. Martin Co., Schenectady visited Hanford on 7-12-56 to consult on fission product recovery.

G. J. Alkire of Hanford attended a conference on Instrumentation at Colby Junior College, New London, New Hampshire on July 23 thru July 27, 1956.

J. H. Kleinpeter of Hanford attended the Maintenance and Protective Coatings School at North Dakota State College, Fargo, North Dakota on July 30 and 31st.

E. E. Voiland of Hanford visited Ionics, Inc., Cambridge, Massachusetts on 7-6-56 to discuss ion exchange technology.

E. J. Wheelwright of Hanford visited Meridan, New Hampshire on 7-27 thru 7-30-56 to attend the Gordon Research Conference.

W. R. DeHollander of Hanford visited the U. S. Bureau of Mines, Albany, Oregon on 7-6 thru 7-8-56 to observe the burning of zirconium scrap, and Portland, Oregon on 7-10-56 to give a talk to the Portland Kiwanis Club and the AEC, Wash. D.C. on 7-16 thru 7-19-56 to attend the Zirconium Hazards Committee meeting.

ORGANIZATION AND PERSONNEL

	<u>June</u>	<u>July</u>
Separations Technology Section	2	2
Plant Processes Sub-Section	64	65
Chemical Development Sub-Section	76	73
Chemical Research Sub-Section	59	60
Contact Engineering Unit	2	2
Analytical Laboratory Unit	38	41
Technical Shops Unit	28	29
	<u>269</u>	<u>272</u>

Plant Processes Sub-Section: R. H. Bond, Engineer I transferred into the Sub-Section from Chemical Development on 7/25/56. WR Hamilton, Engineer II transferred into the Sub-Section from Chemical Development on 7/9/56. M. N. Myers, Engineer II transferred from the Sub-Section to Analytical Laboratories unit on 7/16/56.

Chemical Development Sub-Section: W. R. Hamilton, Engineer II transferred from The Sub-Section to Plant Processes on 7/9/56. R. H. Bond, Engineer I transferred from the Sub-Section to Plant Processes on 7/25/56.

Analytical Laboratories Unit: Mary B. Hall, Lab. Ass't. D transferred to the Unit from the Telephone Section and M. N. Myers, Engineer II transferred to the Unit from Plant Processes on 7/16/56. Dorothy T. Harless, Lab. Ass't. A transferred to the Unit from Radiological Sciences on 7/2/56. Martha H. Buckner and Frances A DeMers, Engineering Assistants were transferred from the Unit to Code 4300.

Technical Shops Unit: V. E. Nord, Drafting Trainee was hired into the Unit on 7/20/56.

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PLANT PROCESSES SUB-SECTION,REDOX PROCESS TECHNOLOGYSummary

Due to the gross contamination of the 233-S Building (plutonium concentration) as a result of the failure of a process valve bellows and subsequent complications, Redox Plant processing ceased abruptly on June 18, 1956, and was not resumed until July 24, 1956.

At the time of shutdown, the 233-S Building was emptied of product except for the L-1 tank which feeds the L-2 stripper. This was full of 3BP solution from 202-S Building and, along with the full E-1 (3AF), E-2 (3BP receiver), E-3 (3BP sampler), and the E-4 (3BP rework) tanks, was held full for nearly the entire five weeks. When the decontamination and rehabilitation of the 233-S Building had reached the point that preparations for resuming operations could be started, it was found that significant deposition of the plutonium had occurred in four of these five tanks during this idle period. As determined by the amount of plutonium accounted for in the supernatants after the initial transfers were made, plutonium deposition ranged from 45 to 95 per cent. Since the plant could not resume operations until these tanks were free of plutonium, some additional delay in startup was occasioned while intensive efforts to flush out the deposits were concentrated in the final few days of 233-S cleanup.

Plutonium Deposition Problem

When the seriousness of the 233-S Building incident was fully realized and it became obvious that the shutdown would be an extended one, some concern was voiced about possible polymerization of the plutonium being held in the many full process vessels.

It was decided that a special sampling program should be started on July 5, to follow plutonium analyses in these various solutions as a function of time. Only two of the above named solutions (E-1 and E-3) could be sampled. These, along with three solutions of metal feed (H-7, metal solution; H-4, oxidized metal solution; H-1, adjusted metal solution), were sampled and analyzed for plutonium every 72 hours. Over the period of about 12 to 15 days, no measurable changes occurred in the plutonium concentrations of the H-7, H-4, H-1, or E-3 solutions. Between the 11th and 14th of July, however, the plutonium concentration in the E-1 solution dropped by over a factor of two. This was tentatively ascribed to the formation of plutonium(IV) polymer, but a concurrent analytical study made by the Control Laboratory failed to show any confirming evidence of polymer in spite of the fact that the acidity of the solution (0.25 M HNO_3) was on the border line of the region in which polymer is reported to form. The E-1 solution continued to decrease in plutonium concentration to a minimum of about 43 per cent of the original value.

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When the time came to start moving the plutonium cycle solutions (E-1, E-2, E-3, E-4, and L-1) in preparation for startup, it was found that the amounts of plutonium removed from these tanks (exclusive of E-3) on the first transfer attempt ranged from five per cent (from E-4) to 55 per cent (from E-1) of their estimated original contents. It was thus necessary to flush these tanks exhaustively with nitric acid and/or potassium permanganate solution to remove the balance of plutonium unaccounted for. This was successfully done, and the plutonium in the E Cell tanks was returned to Head-End and blended with virgin feed solution. That in the L-1 tank (plus subsequent acid flushes) was processed the rest of the way through the 233-S Building by itself to facilitate accountability. Based on the best available estimates of the total amount of plutonium involved in these five tanks, the final recovery was 105 to 110 per cent, with the discrepancy undoubtedly resulting largely from heels picked up in the course of processing the L-1 material through the stripper and final concentrator in the 233-S Building.

If polymeric plutonium(IV) is not involved in this problem (or at most, only slightly), a possible explanation can be advanced, based on some early work at ANL and HAPO⁽¹⁾ in which plutonium precipitation from hexone saturated Redox streams was observed as a function of time. Reaction products of hexone and nitric acid (principally the methyl isopropyl diketone) were complexed by plutonium(IV), followed by the formation of the precipitate which was reported to be plutonium oxalate. It was found that the presence of nitrite ion increased precipitate formation, presumably due to the oxidation and reduction of plutonium (III) and plutonium(VI), respectively, to the plutonium(IV) needed to take part in the reaction. The formation of the precipitate itself was preceded by a marked shift in the absorption spectrum of the solution, indicating that complexing was taking place.

In general, the pattern of behavior in the plant fitted the experimental work as well as could be determined, with one exception. The exception was the E-3 (3BP) solution from which no significant amount of plutonium was deposited. This has not been explained, but could possibly be due to the fact that at one point during the shutdown, the contents of this tank were heated to about 90 C for a short time, which may have been sufficient to drive off the hexone and forestall appreciable complexing. It is interesting to note in this connection that the H-1, H-4, and H-7 solutions containing no hexone showed no change in plutonium concentration during storage. These solutions, however, also contained ca. 2.0 M UNH.

The plutonium in the E-4 tank was nearly all precipitated as noted above. This, in the light of the experimental work involving nitrite ion, may be explained by a hexone-nitric reaction in the E-5 (2AF) tank which occurred during the acid flushes shortly after shutdown. This reaction pressurized the E-5 vessel sufficiently to discharge about five gallons of the reaction mixture through the vent line and into the E-4 tank. Since the reaction undoubtedly produced both nitrites and hexone decomposition products, the precipitation in E-4 was very likely grossly accelerated by this admixture.

- (1) HW-17542, "Progress Report for March, 1950 - Chemical Research Section", April 17, 1950.

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No evidence has been found that this precipitation occurs during normal processing and, based on the above laboratory work, there is no reason to suspect that it can occur. The samples taken from the E-3 tank were checked by spectrophotometer and found to be free of complex even after four weeks. In view of the fact that the reaction occurred only slowly (in the E-1 tank, at least, as well as in the laboratory) and only in hexone saturated solutions, the conclusion is reached that, to prevent a repeat of this phenomenon in the case of future shutdowns, the plutonium and the hexone must be separated. If this separation is not possible, an oxidizing agent, e.g., dichromate ion, can be added to the solution to destroy the methyl isopropyl diketone and, at the same time, prevent the reduction of plutonium(VI) to plutonium(IV).

PUREX PROCESS TECHNOLOGY

Summary

Purex Plant production continued at a capacity factor of 1.44 until July 6. Process performance was generally smooth, but over-all decontamination was slightly inferior as a result of active solids in the plant resulting from the waste rework operation of last month. Silica gel treatment of uranium product was required to meet specifications. An improved low acid final plutonium cycle flowsheet was instituted to give a six fold improvement in plutonium decontamination. On July 6, after the dissolver heels were processed, the plant was shut down to convert to high g/t production. During the shutdown, all the solvent extraction columns were flushed, the 2AF tank J5 was replaced with the spare tank modified to permit a 2.5 fold increased critical mass specification, and the plutonium concentrator E-L4 tube bundle was replaced.

On July 14, the Purex Plant was restarted at a capacity factor of 1.44 with the same flowsheet conditions which prevailed at the July 6 shutdown time. Gamma decontamination of uranium was inadequate because of the presence of filterable activity in the plant. Plutonium decontamination was adequate, but after ten days of operation, it was necessary to shut the plant down because of an excessive (ca. 2.5 days' production) buildup of plutonium in the concentration equipment and plugging of the plutonium concentrator E-L4 and drain lines. The remainder of the month was devoted to recovering the plutonium from the equipment and chemically removing a siliceous scale from the concentrator.

Feed Preparation

Irradiated uranium slugs with an exposure of 2.8 to 6.7 MW/T (245 and 860 MWD/T) and cooling times from 95 to 245 days were dissolved in the two dissolvers. At the conclusion of charging low MWD/T metal to the dissolvers, the uranium heels were removed. The A and B dissolvers yielded 23.5 and 28.6 tons, respectively. Since changing to high MWD/T metal, no process difficulties have been encountered. However, as noted previously in other separations plants, dissolution rates for high MWD/T metal increased approximately 20 per cent over those for low exposure metal. Analyses of metal solution indicate the mole ratio of nitric acid consumed to uranium dissolved has increased from 3.5 to 3.8. Additional evaluation of this trend is required before conclusions can be drawn.

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Radioiodine to the stack varied between 0.02 and 25 curies per day with an average of less than 0.1 curie per day, excluding the 25 curie value which appears to have been associated with a reactor failure. During this period, the scintillation iodine monitor indicated approximately one curie in the dissolver off-gases; however, it was subsequently determined that the differential analyzer was malfunctioning. With this one exception, the monitor has operated satisfactorily with only minor difficulties, one being a periodic plugging of the gas discharge line with a water soluble salt which prohibits the monitor from obtaining a representative sample.

Solvent Extraction

A nominal production rate of 1.44 capacity factor was maintained until July 6. At this time, the Purex Plant was shut down in order to convert to processing of high g/t material. The following table summarizes the steady-state performance of the solvent extraction batteries from June 25 to July 6:

<u>Cycle</u>	<u>Log Gamma Decontamination Factor (dF)</u>		<u>Per Cent Waste Loss</u>	
	<u>Uranium</u>	<u>Plutonium</u>	<u>Uranium</u>	<u>Plutonium</u>
Precycle	3.0	3.0	0.02	0.30
Partition	2.3	1.8	0.02	0.30
				(IBU-0.06)
Final	1.2	3.6	0.08	0.10
Over-all	6.5	8.4	0.12	0.76

During this operating period, the gamma activity of all intercycle streams and products increased as a result of waste rework additions to the HAF and inadequate decontamination of the solvent in the No. 1 organic treatment system. Although the gamma activity of the intercycle streams decreased after stopping waste rework, the gamma activity of the uranium product levelled out about two fold above specifications, requiring the use of silica gel Tail-End treatment prior to shipment. The 2AF gamma activity increased to five fold normal level as a result of waste rework. In order to insure a satisfactory plutonium product, the final plutonium cycle flowsheet was changed to the following new ("low acid") flowsheet which has been adopted:

<u>Stream</u>	<u>Flows</u>		
	<u>HAF = 100</u>	<u>HNO₃, M</u>	<u>NaNO₂, M</u>
IBP	31	1.7	
2AF-HNO ₃	4.8	10.6	
2AF-NaNO ₂	1.7		1.6
2AF	37.5	2.75	0.073
2AS	4.8	0.75	
2AX	10.9		
2BX	5.5	0.01	
2BP	5.5	0.26	

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During the flowsheet transition, the 2AW plutonium losses increased to a maximum of 1.2 per cent. Subsequent increases in the 2A Column frequency lowered the 2AW plutonium loss to approximately 0.1 per cent. As a result of this flowsheet change, the decontamination factor across the final plutonium cycle increased about six fold.

From July 6 to 14, the plant was shut down in order to deplete the inventory of low g/t plutonium and prepare for processing of high g/t plutonium. All of the solvent extraction columns were flushed, including the IBX and IBS columns which had not been drained since hot startup of the plant. In addition, the plutonium concentrator E-14 tube bundle was replaced, and the 2AF tank J5 was replaced with the spare having the downstream vertical baffle removed. This change of the 2AF tank was made to permit a 2.5 fold increase in the critical mass control specification for this tank prior to processing of high g/t plutonium. Data from processing since this change have confirmed the belief that adequate holdup time would be available for plutonium oxidation without the tank baffling. Thus, the requirement for a newly designed 2AF tank no longer exists for current flowsheets.

On July 14, the Purex Plant began processing high g/t material at a nominal production rate of 1.44 capacity factor with the same flowsheet conditions which prevailed at the shutdown on July 6 (Purex Plant Flowsheet II with modified final plutonium cycle). Although the uranium product was recycled for HAF makeup prior to shutdown in order to lower the activities in the HA Column, the gamma activities throughout the plant were excessive (five to 100 fold high) immediately after startup. These high activities probably resulted from poor stripping techniques and the carryover of interface solids into the intercycle concentrators when the plant was shut down. However, within a few days all of the intercycle and product streams had returned to their normal activity levels except for uranium product. As a result, uranium product was recycled for HAF makeup until July 20. The recycle was stopped even though uranium product was still 15 fold high in order to permit increases in the plutonium concentration in the HAF to benefit the plutonium concentration operation. Also, decontamination of uranium appeared to be impaired by continued recycle.

The 2DF gamma activity reached a peak (100 fold higher than normal) shortly after startup, but this activity decreased rapidly as did the other intercycle stream activities. However, the gamma activity of the uranium product decreased more slowly and appeared to be levelling out five to ten fold above specifications. The decontamination factor across the final uranium cycle was only two instead of 20. Laboratory data obtained from tests with plant 2DF indicated that filterable activity was present (a decontamination factor of three obtained by filtration), and normal fission product distribution ratios existed which should have resulted in adequate decontamination across the 2D Column. Thus, the 2D Column was flushed on July 25 (when the plant was shut down because of plutonium concentration difficulties) to remove solids accumulated from the excessively high 2DF experienced on startup.

Shortly after the July 14 startup also, an apparent loss of partitioning of plutonium from uranium occurred. As a result, the final uranium cycle was

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temporarily shut down, and the IBX ferrous ion concentration was increased for twelve hours from 0.03 M to 0.05 M Fe^{+2} . After a few hours, the system corrected itself, the final uranium cycle was restarted, and the IBX ferrous ion concentration was returned to 0.03 M. The apparent poor partitioning of plutonium from uranium was actually a buildup of plutonium in the IB Columns, probably caused by an excessive nitrite addition to the IAF at startup. No appreciable amount of plutonium was lost from the IBX Column. Following the increase of the IBX ferrous ion concentration, the 2AW plutonium loss increased to a maximum of five per cent. Coincident with the return to normal 2AF sulfate concentration (sulfate concentration is proportional to the iron concentration), the 2AW plutonium loss returned to less than 0.1 per cent. These data confirm the fact that the low acid plutonium cycle flowsheet is adversely affected by sulfate ion, the sulfate complexing plutonium into an inextractable state.

Plutonium Concentration

On July 20, continuous water addition was started to the plutonium concentrator E-14 in order to reduce the acidity of the product solution to ca. 5.0 M HNO_3 (to meet product specifications and to reduce corrosion of the concentrator). The first batch collected following introduction of the dilution water indicated a decrease from 7.0-8.0 to 4.0 M HNO_3 . After approximately 18 hours of operation, the water addition was stopped because difficulties in flow control made the addition rate uncertain, and insufficient plutonium concentration was being achieved. When water addition was restarted the following day, failure of the concentrator steam trap prevented operation at the necessary increased boilup rate. Even after water addition was stopped, difficulties with the concentration rate and a plugged drain line from the concentrator to the receiver hampered operation. The steam trap was bypassed and the plug broken in the drain line. Continued recurrence of the plug in the drain line plus a rapid buildup of plutonium in the concentrator package forced a shutdown of the plant on July 24. At this time, material balance calculations indicated a holdup of approximately 2.5 days' plutonium production. At month end, all of the plutonium has been removed from the equipment, and the majority of it has been shipped to Z Plant for further processing.

Reports of visual observations made at the time of the E-14 plutonium concentrator tube bundle change on July 14 indicate that considerable scale was present in the bottom recirculation loop of the concentrator. (This 304-L stainless steel bundle was in service for 50 days of operation, compared with 59 days of hot operation for the first bundle; the replacement bundle is also 304-L steel.) It is believed that the above scale caused the plugs in the concentrator and lines mentioned above. A spectrographic analysis of the scale shows it to be primarily silica with lesser amounts of corrosion products. Following removal of the plutonium from the equipment, the stripper and concentrator were flushed with boiling 20 per cent NaOH to remove the silica.

Uranium Processing - Silica Gel

Sixty units of uranium which had an initial gamma ratio of 20 were recycled through the silica gel beds for seven days. It was processed at a capacity

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factor of 1.7 and a temperature of 50 to 60 C. After seven days of recirculation, the gamma ratio of the uranium had been reduced to six. The beds were regenerated, and the uranium was recirculated for another seven days, and the gamma ratio was further reduced to 3.5. These 60 units of uranium were shipped to the TBP Plant for further processing because the decontamination factor across the silica gel beds was essentially unity the last two days.

Without regeneration of the beds, the silica gel facilities processed about 130 units of uranium with a gamma ratio of 3.7. This material was reduced to a gamma ratio of 1.7 while processing at the same conditions as indicated above.

The beds were then regenerated, and 14 units of uranium with a gamma ratio of 20 were again processed. This material was reduced to a gamma ratio of 2.7. However, it was necessary to recirculate the feed for two to three passes before the silica gel product was consistently below a gamma ratio of three. This was the first time that the silica gel facilities at the Purex Plant have successfully treated uranium with a gamma ratio of 20. The success was attributed to the higher feed temperature (65 to 85 C) and the shorter storage time before processing.

Organic Treatment

The average performance of both organic systems during normal operation are summarized below:

Organic Treatment System	Organic Activity, $\mu\text{c/gallon}$				Average DF ⁽¹⁾	Organic Loss, % of Gallons Processed ^(1,3)
	Unwashed		Washed			
	Maximum ⁽¹⁾	Minimum ⁽²⁾	Maximum ⁽¹⁾	Minimum ⁽²⁾		
No. 1	80,000	8,000	8,000	1,000	9	0.35
No. 2	200	50	20	5	10	0.33

(1) During period of processing waste rework material.

(2) During period of normal operation.

(3) Does not include loss of ca. 4000 gallons during shutdown and startup on July 8 and 14.

The decontamination performance of both systems was inferior because of several abnormal occurrences. Initially, the activity of the No. 1 system organic increased markedly as a result of processing waste rework material. This activity increase was reduced by batch washing the organic in the IOO receiver tanks G5 and G7. During two plant shutdowns, on July 6 and 24, the usual increase in organic activity associated with the displacement of the C Column interfaces to the IOF and 20F tanks occurred, and was reduced by sodium carbonate washes and flushes of the organic system during the shutdowns.

Due to normal operating losses and losses which occurred during the shutdowns and startups, the No. 1 system inventory was replaced by transferring the No. 2 system inventory to the No. 1 system and replacing the No. 2 system inventory with fresh organic. The dilution of the No. 1 system inventory effectively reduced the residual I^{131} content of the organic from 70 to 25 per cent of the total activity.

On the first of this month, another attempt was made to operate the IO Column with a top interface, but the column flooded within two hours and was returned to normal operation (bottom interface).

In line with the continuous program of reducing waste volume from the organic treatment systems, the contact ratio of the organic (feed) to aqueous (scrub) has been increased from 22 to 30 volumes of organic processed for every volume of 2.5 weight per cent sodium carbonate. Based on results of ten days' operation, it appears that this new ratio is close to the maximum at the present capacity factor. This increase in contact ratio results in a 20 per cent reduction in the amount of waste sodium carbonate sent to underground storage below the original startup flowsheet. This improvement, combined with the reduction in carbonate usage by the use of the IOF tank G1 as a precontactor (reported last month), results in an over-all reduction of 30 per cent in carbonate usage.

Waste Treatment

The waste concentration and acid recovery systems processed extraction wastes and nitric acid flushes during the period without difficulty. During the shutdown, the No. 1 and No. 2 acid concentrators were flushed with five per cent caustic solution by refluxing each unit for two hours. Subsequent operation of the concentrators has shown no significant improvement in concentrator operation.

During normal operation, the neutralized IWW, IOW, and 2OW were maintained on essentially flowsheet conditions, i.e., approximately 200, 300, and 100 gallons per ton, respectively. However, the waste from flushing of F, G, and R Cell vessels and from recycling product uranium increased the average total volume of neutralized IWW, IOW, and 2OW to 1000 gallons per ton for the report period. The average total volume is pertinent in regards to control of self-concentration at the underground storage facility.

Underground storage tank 241-A-103 contents started boiling on or about June 28. The tank then contained about 150,000 gallons of neutralized wastes, predominately neutralized IWW. Subsequent to the start of boiling, the carbonate wastes were rerouted into the tank. Mild bumping has occurred in the tank as measured by tank pressure and contact condenser cooling water temperature. Vapor pressures during bumping have ranged from one to twelve inches of water pressure. Estimated maximum steam removal rates at the condenser have been ten to fifteen thousand pounds per hour. Bumping has ceased since the plant was shut down and the large volumes of plant flushes were added to the vessel.

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DECLASSIFIEDURANIUM RECOVERY PROCESS TECHNOLOGYSummary

Although plant production was rather low, solvent extraction performance was excellent. Over-all uranium losses averaged 0.6 of the gross, or 0.8 per cent of the virgin uranium processed. Product gamma activity averaged 75 per cent of the activity of aged natural uranium, and the over-all logarithmic gamma decontamination factor was consistently about 4.8.

The cobalt-60 concentration of the neutralized, scavenged waste exceeded 4×10^{-5} microcuries per milliliter (the upper limit for crib disposal) by factors of about 50. Consequently, 8500 gallons of waste per ton of virgin uranium processed were stored in the existing underground tanks. Two tests were completed, but neither improved cobalt decontamination. It is postulated that these plant tests failed because cobalt was complexed by cyanide ion formed from prolonged contact of sodium ferrocyanide and acid waste.

Solvent Extraction

The first cycle processed feed of about flowsheet composition which, until July 20, was aged an equivalent of 17 months since irradiation to 200 MWD/T. Thereafter, essentially all the feed came from tank 107-TX and was aged 13 months since irradiation to 250 MWD/T.

Uranium waste losses were generally low, averaging 0.2 and 0.05 per cent of the gross feed uranium in the RAW and REW, respectively. The RCW loss averaged 0.3 per cent. During one two-week period, however, this RCW loss was consistently about 0.1 per cent, and the average column specific gravity was 0.94 instead of the "normal" 0.97. Thus, it appears that a poor dispersion or organic phase channeling caused by abnormal plate conditioning might be the cause of the abnormally high RCW losses.

Logarithmic gamma decontamination factors and REU gamma activity averaged 4.8 and 75 per cent of aged natural uranium activity, respectively. The 13 month aged feed from 107-TX tank was processed for too short a period to have a significant effect on over-all decontamination. Rework batches of canyon waste from tank 4-6 occasionally carried ferrocyanide precipitates into the first cycle. Short term increases in the RCU gamma activity resulted. The large holdup in the intercycle feed system damped out these variations, however, so that there was no noticeable change in REU activity.

Production sized "Fulflo" filters with glass wool elements were installed in the water scrub, acid scrub, and three per cent sodium carbonate lines. Since the filters have been in operation less than two weeks, no significant variations in process performance are yet discernible.

Waste Treatment

No waste scavenged in the TBP Plant was cribbed during the report period because of high cobalt-60 concentrations. Eight tanks of TBP Plant and four tanks of

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"in farm" scavenged waste are currently stored. All available storage space will be used by the latter half of August, and waste disposal to ditches on an emergency specific retention basis will be necessary.

Two plant cobalt scavenging tests were completed during the report period. However, neither the addition of part of the nickel scavenger about three hours after neutralization nor the addition of inert cobalt to the acid waste improved the removal of cobalt-60. The failure of these plant tests is attributed to the fact that ferrocyanide dissociates slightly after prolonged contact with acid solutions. The cyanide ions thus formed complex cobalt tightly so that scavenging operations are ineffective. A source of cyanide ions exists in the plant since a five to ten per cent heel of ferrocyanide butted acid waste remains in the waste sampler tanks after each batch is neutralized. A less likely, but possible, source also occurs as a result of about a three hour elapse between the addition of sodium ferrocyanide to the acid waste and neutralization of the waste batch.

In May and June, cobalt decontamination across the scavenging step was exceptionally low. During this period, feed came from tank 101-T which had been used as a settling tank for the original waste scavenging test and still contained a nickel ferrocyanide solids heel. It is probable that this ferrocyanide heel was carried into the acid feed and caused the decreased cobalt decontamination. An improvement in cobalt removal was noted starting about two weeks after tank 101-T feed was discontinued.

Cobalt sulfate for additional plant scavenging tests is available. These tests will be made as soon as procedural details are resolved by laboratory tests.

URANIUM CONVERSION PROCESS TECHNOLOGY

Process

In general, the quality of the powder produced during July improved over that produced during June. The gamma activity of the powder decreased from about 90 per cent that of aged natural uranium to about 40 per cent. The gamma activity of the ten car block of powder produced during the latter part of June averaged 102 per cent that of aged natural uranium, while the first eight cars of the current block average 39 per cent. The particle size of the product generally fluctuated within the specification limit. However, one car required a customer waiver for shipment. The reactivity ratio of the product ranged between 0.93 and 1.03 and averaged 0.98, as determined by the high temperature test which was adopted on June 21. In this laboratory procedure for measuring the reactivity of UO_3 , the reduction and hydrofluorination temperatures are carried out at 925 and 600 C, respectively. The total metallic impurities in the product averaged about 90 parts per million parts of uranium.

Although foaming occurred periodically in the electric pots, production was not affected seriously, except for one short period. The cause of foaming

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during this period was improperly stripped REU. Laboratory studies revealed no other reason for the sporadic foaming that was experienced.

Tests

To estimate the composition of the HNO_3 that will be recovered when the TBP Plant shuts down, samples of the TA-1 acid absorber product and the TBP and Purex feed stocks were taken. The absorption system sample was from the bottom plate of the absorber rather than the acid product tank (C-4), because the C-4 acid contains the chloride purge and the acid fractionator bottoms. The results are:

	<u>Absorber Product</u>	<u>TBP Product</u>	<u>Purex Product</u>
Uranium, lb/gal	0.14	0.44	4.2
Nitric Acid, lb/gal	4.1	0.04	0.1
Chloride, ppm-solution	5	----	----
Chloride, ppm-uranium	----	90	9
Gamma, μ c/gal	40		
Beta, c/m/gal	9.3×10^6		
Gamma Scan	95% Ru		

A sample of the absorber acid was submitted to the Process Chemistry Unit for solvent extraction studies.

Z PLANT (ISOLATION, PURIFICATION AND FABRICATION) PROCESS TECHNOLOGY

Purex Coupling

The first few runs of high n/g-s plutonium from the Purex Plant, produced after replacement of the plutonium concentrator tube bundle, contained enough solid material (probably silica) to cause operational difficulties in Task I (oxalate precipitation) through repeated blinding of the filter in the load-in line. The metal buttons produced from this material had gamma radiation levels higher than predicted from previous data. The failure to achieve the expected decontamination is attributed to the carryover, by the solids in the feed, of fission products into the precipitate.

Recuplex

Process highlights during July included the following:

- (1) Dichromate killed, plutonium peroxide supernatants from the 231 Building were processed with no difficulty. Excess dichromate was destroyed with nitrite in the course of feed preparation.

- (2) Two uranium-plutonium partition tests were made. The first, an attempt at batch partition by extraction of the uranium after reduction of the plutonium with ferrous ammonium sulfate-sulfamic acid, was not completely successful because reduction of the plutonium was not complete in the time allowed. The second attempt showed the feasibility of making uranium-plutonium separations in the Recuplex stripping columns by taking advantage of the difference in the extraction coefficients for plutonium and uranium and permitting the uranium to accumulate in the solvent, for periodic removal by solvent treatment.
- (3) "Hot" Purex cleanout runs were processed, with a decontamination factor of 50.

Tests of the use of neutron counting techniques for monitoring the plutonium content of process streams show favorable results. The method should be applicable for solutions containing as little plutonium as a fraction of a gram per liter.

234-5 DEVELOPMENT

Continuous Task I - Prototype

A U-shaped glass pipe prototype for continuous kills of oxalate filtrates was installed in the Task I hood to study the effects of backmixing and to make a continuous kill in large scale equipment. The kill was complete, and no backmixing problems were encountered.

The small laboratory runs reported previously used an oxalate-permanganate reactor with a height to area ratio of 18. In the plant, a ratio of 2.6 is expected; hence, this latter ratio was used in the present prototypical tests. The U-shaped reactor had a four inch diameter oxalate-permanganate reaction arm and a one inch peroxide arm joined at the bottom to complete the U. The four per cent potassium permanganate stream and the simulated supernatant were mixed in a common line before entering the reactor. The supernatant composition was 1.5 g/l plutonium (as plutonium(IV) oxalate aged 18 hours), 0.1 M oxalic acid, 2.0 M HNO_3 , and 3.3 g/l Fe^{+3} . The combined streams were then heated with two glass immersion heaters. A residence time of 15 minutes at 45 C produced satisfactory kills, and no backmixing problem was observed.

This work showed the necessity of using a larger diameter arm for the peroxide addition arm. This was evident from the change in head produced by sporadic addition of ten per cent peroxide and decomposition in this smaller arm, which resulted in a liquid level control problem in the oxalate-permanganate reaction arm. Some manganese dioxide collected in the bottom of the U; however, periodic recycling of the peroxide kill effluent as proposed in the continuous Task I scope prints can prevent this from becoming a problem.

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DECLASSIFIEDContinuous Task I - Process Tests

Further tests were run on the stability of killed and concentrated Task I filtrates. No difficulties with precipitation were observed.

Simulated evaporator bottoms solutions were made up, based on Task I feed of 100 g/l plutonium containing 200,000 ppm iron, 10,000 ppm each of aluminum, nickel, and chromium, and 5.0 M HNO_3 , with a simulated five per cent plutonium loss to the filtrate. After standing for nearly one month, no precipitation has been observed. Solutions based on 150,000 ppm iron and 100,000 ppm aluminum were also made up (no plutonium) and, after four weeks, no precipitation has appeared, including samples which were seeded with ferric nitrate, aluminum nitrate, or manganese dioxide.

Destruction of oxalate by oxidation with the nitric acid present in filtrate during the evaporation step could eliminate the need for permanganate addition. However, reaction of the residual oxalate with plutonium could result in solids. A sample of bottoms from the evaporative kill of a Task I filtrate (based on 35,000 ppm iron, 10,000 ppm each aluminum, nickel, and chromium in the feed, and a concentration factor of six) has shown no precipitation after four weeks. The sample is 0.002 M oxalic acid, 9.0 g/l plutonium, and ca. 4.0 M HNO_3 .

Another test was done on possible solids deposition on evaporators, this time using a piece of 3/8 inch stainless tubing to simulate an evaporator tube. A heating tape wrapped around the tube was used to boil the bottoms solution. After running for four hours at a tape temperature of 150 C (the heated zone extended above the liquid level on the tube), no solids had deposited on the tube surface.

Examination of Crud from Redox Concentrator Valve

Two different samples were taken from the 233-S Building L-3 to L-4 valve which had failed. One type of crud taken from the bottom or main body of the valve was radioactive with beta and gamma. Thirty-three per cent of the gamma activity was from ruthenium and 66 per cent from zirconium-niobium, with very little plutonium gamma activity. The accompanying beta activity is thought to be due to ruthenium-106. Chemical behavior indicates the deposit to be mainly silica.

The other crud, taken from the bellows portion of the valve, indicates the material to be largely a mixture of chromium, aluminum, copper, iron, and nickel nitrates. Plutonium analysis of this material as received indicates a plutonium content of 6.4 per cent.

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CHEMICAL DEVELOPMENT SUB-SECTION,

HOT SEMIWORKS

Maintenance Activities. Maintenance work in C Cell was essentially completed, and the cell is being used to store dissolver solution from A Cell. A Cell decontamination work is in progress and tank flushing efforts are essentially completed. Additional decontamination effort will be required to reduce the activity in several "hot" spots within the cell and to reduce the high radiation field on the cell floor. At the present time when looking down into the cell through the cover block holes radiation fields varying from 50 to 200 mr/hr are encountered. At the A Cell doorway a 300 mr/hr field is encountered. In several local "hot" spots and in floor areas within the cell where spills have been known to occur readings range from 5 to 40 rads.

PUREX DEVELOPMENT

Process Chemistry

Filter-Coalescer Development. A York Mesh coalescer composed of 0.006-inch stainless steel wire (packed density 13 lb./ft.³) was tested for removal of aqueous entrainment from synthetic IAP. This material proved to be completely ineffective, even at flow rates as low as one gal./min.)(sq.ft.).

A single pass of Purex IBXF (6-26-56) was made through a number of coalescer media, including glass wool, sea sand, sea sand plus Filtrol, and Anthrafilt. An arithmetic D.F., based on gamma scan analyses, of approximately ten was obtained in all cases. Following filtration through sea sand, the IBXF was equilibrated with water and with 3 M HNO₃. Gross gamma distribution ratios of 2.2 and 13, respectively, were obtained, indicating that the bulk of the "soluble" activity present in the IBXF sample received was in an unscrubbable form.

Gross gamma determinations made on the IBXF (sample mounted on disk and counted on gamma scintillation counter) were five to ten times lower than those determined by gamma scan analyses, indicating appreciable coalescence during sample manipulations in the former case. Plant decontamination performance is based on gross gamma analyses as determined by a direct mount.

A synthetic HCP containing tracer zirconium was spiked with one volume per cent of HAX and refluxed for 40 hours. Batch contacts simulating IA Column extraction and scrub contacts were then made using this two-phase material (butted to 3 M HNO₃) as feed. Distribution ratios for extraction and scrub contacts were 1.2 and 5.1, respectively. When the organic phase was removed from the refluxed HCP prior to contact, distribution ratios were no less favorable than those obtained in a control run.

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Miniature Pulse Column Runs: Simulated IA Column runs were made in a miniature pulse column (alternate stainless steel sieve plates and shredded fluorothene in both extraction and scrub sections) to determine the feasibility of operation with the organic phase continuous. Flooding tendencies were apparent at very low volume velocities and control of the column was difficult. Visually, the dispersion was very poor. However, gross gamma decontamination factors were slightly higher than those obtained when operating with the aqueous phase continuous. These data indicate that either organic phase hold-up time in the scrub section or transport of activity from the interface to the product solution may be limiting fission product decontamination.

Tail-End Ion Exchange. Batch contact experiments to determine Pu distribution ratios between resin (Dowex 50W) and eluting solutions have been concluded. Distribution ratios (Pu conc. on resin/Pu conc. in solution) for elution with 6 M HNO_3 - 0.3 M $\text{NH}_2\text{SO}_3\text{H}$ were found to be 1.77 and 0.712 at resin bed saturations of 0.01 and 40 per cent, respectively (153 g. Pu/l. of resin = 100 per cent saturation). Under the conditions of Study Flowsheet No. 2 it appears possible to produce a product stream containing 90 g. Pu/l. from a resin bed loaded to 100 g. Pu/l. of resin. A detailed report of the work is now in preparation.

Solvent Quality. Examination of all solvent quality test results obtained since start-up of the Purex Plant indicates that fresh solvent introduced into the No. 1 organic system degrades rapidly (as evidenced by standard batch contacts simulating extraction, scrub, and strip column conditions) to a point where Zr-Nb decontamination factors are about four-fold lower than those obtained with laboratory solvent. Steady state conditions are then established and no further decrease in solvent quality occurs. Currently, the gross gamma content of the IOO is about 2×10^3 microcuries/gal. About 80 per cent of this radioactivity is due to I^{131} , thus no significant increase in retention of Zr-Nb or Ru has occurred since shortly after start-up. Purex Plant second cycle solvent, though slightly degraded as evidenced by optical density measurements, remains indistinguishable from laboratory solvent as regards fission product decontamination behavior.

Chemical Engineering Development

Solvent Extraction Studies. Studies this month were directed toward the investigation of the behavior of an organic phase continuous dual-purpose A-type column with a cartridge of potential use in the Purex Plant 2D Column.

The studies were made in a column with a 3-inch-diameter, 9-foot-high glass extraction section and a 4-inch-diameter, 8-foot-high glass scrub section. Both Purex HW No. 3 Flowsheet and Purex Plant Flowsheet No. 2 were used. One-half molar NaCl was added to the HAF in those cases where scrub section efficiency was measured.

Scrub Section Studies. Nineteen runs were made to determine the efficiency of a mixed cartridge containing alternate pairs of stainless steel and fluorothene sieve plates, and, for comparison, of a standard sieve plate cartridge operated with the aqueous phase continuous.

The details of the cartridges and the results of the studies are presented in Table I. Highlights of the findings are summarized below:

1. The chloride decontaminations attained with the mixed cartridge operated with the organic phase continuous were approximately the same as those attained with the standard cartridge operated with the aqueous phase continuous.
2. The chloride decontaminations attained with the mixed cartridge in the dual-purpose column ranged from one-half to two-thirds those attained with the same cartridge in a 3-inch-diameter simple scrub column.

The primary reason for this is believed to be due to the fact that the simple column runs were made with the cartridge maintained at a high degree of cleanliness, whereas the cartridge of the dual-purpose column was not. The effectiveness of the mixed cartridge arises from an inversion of phases at the stainless steel plates. However, after a few days operation, the plates accumulate a foreign material which results in the stainless steel plates becoming partially organic wet. The extent of inversion of phases at the stainless steel plates then decreases with a consequent loss of scrubbing efficiency.

Extraction Column Studies. Two extended runs were made using the 2D Column Purex Plant No. 2 Flowsheet. One run was made with a 23 per cent free area nozzle plate cartridge operated with the organic phase continuous and, for comparison, one run was made with a graded plate cartridge of the type presently installed in the Purex Plant HA and 2D Columns operated with the aqueous phase continuous.

The details of the cartridges and the results of the studies are presented in Table II. The highlights of the findings are:

1. The graded plate cartridge at a processing rate of 10 tons uranium per day and a pulse frequency of 80 cycles per minute operated satisfactorily for eight hours with waste losses averaging 0.12 per cent. After approximately an additional two hours of operation, the dispersion loosened and the waste losses rose to a peak of approximately 6 per cent. During the remaining six hours of the run, the waste losses were gradually dropping, reaching 1.5 per cent at termination. No abnormal operating conditions were noted during the period of high losses. It may be that the graded plate cartridge which was tailored for the Purex HW No. 3 Flowsheet is not the optimum for the flowsheet tested.

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2. The nozzle plate cartridge run, operated for 30 hours at a processing rate of 10 tons uranium per day, was started at a pulse frequency of 100 cycles per minute. After approximately six hours of operation cyclic coalescence started in the middle of the column. This continued for eight hours at which time the pulse frequency was lowered to 90 cycles per minute. Coalescence disappeared and the run was completed at 90 cycles/minute. During the period when the cyclic coalescence was occurring, the waste losses were erratic and varied from 0.04 to 6.5 per cent. During the final 16 hours of the run at the reduced pulse frequency, the waste losses were consistent and satisfactory, averaging 0.02 per cent.

On the basis of the Demonstration Unit glass columns the combination of a mixed cartridge scrub section containing alternate pairs of stainless steel and fluorothene sieve plates and a 23 per cent free area nozzle plate cartridge extraction section operating with the organic phase continuous should perform satisfactorily in the Purex Plant 2D Column.

The nozzle plate extraction cartridge is as efficient or more so than is the present graded plate cartridge under conditions of Purex HW No. 3 Flowsheet, Purex HW No. 5 Flowsheet, or Purex Plant Flowsheet No. 2.

The mixed cartridge scrub section, when freshly cleaned, is capable of greater efficiency than is the standard cartridge and after the accumulation of foreign material arising from extended operation has at least as high an efficiency as does the standard cartridge.

Continuous Ion Exchange. The Higgins-type continuous ion exchange unit exhibited satisfactory mechanical operation with 50 - 100 mesh Dowex 50W resin. The injection of additional slip water to the top of the downcomer (3-inch-diameter pipe connecting the loading and stripping sections) appears to be a satisfactory method of keeping the downcomer free of resin. Resin movement was accomplished with pressures of 35 to 40 psig.

An efficiency run utilizing 1 g./l. Fe+++ in 0.5 M HNO₃ as feed and 6 M HNO₃ as strip solution was made. Although the A Column waste loss was 25 per cent, preliminary H.E.T.S. values of 18 inches and 8 inches were obtained for the extraction and stripping columns, respectively.

Samples of different grades of dry Dowex 50 were screened to determine particle size distribution with the following results:

<u>Grade</u>	<u>Nominal Mesh Size</u>	<u>% Oversize</u>	<u>% Undersize</u>
Dowex 50	20 - 50	25	2
Dowex 50	50 - 100	25	2
Dowex 50W	50 - 100	51	3

TABLE I

PUREX 4-IN. HA SCRUB COLUMN EFFICIENCY STUDIES

Flowsheet: Purex HW No. 3, Pu and F.P.'s omitted. NaCl added to HAF. Shell E-2342 diluent.

Equipment: Dual-purpose column with a 3-in. diameter, 9-ft.-high precision bore glass extraction section and a 4-in.-diameter, 8-ft.-high standard bore glass scrub section. Cartridges are specified in the notes.

Pulse Amplitude: 0.6 in. in the scrub section.

Run No.	Cartridge (a)	Continuous Phase	Pulse Frequency, Cyc./Min.	Volume Velocity, Gal./(Hr.)(Sq.Ft.) Sum of Both Phases	L/V, Aq./Org. Flow Ratio	Cl ⁻ (b) DF
4-3-ASH	A	Organic	100	240	0.175	14.9
4-4-ASH	A	Organic	80	490	0.174	4.5
4-5-ASH	A	Organic	60	490	0.185	3.4
4-6-ASH	A	Organic	80	250	0.176	2.8
4-7-ASH	A	Aqueous	60	500	0.182	3.2
4-8-ASH	A	Aqueous	80	240	0.173	2.9
4-9-ASH	A	Organic	80	480	0.189	5.9
4-10-ASH	A	Organic	100	240	0.182	12.8
4-11-ASH	A	Organic	60	470	0.190	3.6
4-12-ASH	A	Organic	80	460	0.191	5.0
4-13-ASH	A	Organic	70	480	0.183	4.5
4-16a-ASH	B	Aqueous	95	230	0.157	5.0
4-16b-ASH	B	Aqueous	90	240	0.196	8.0
4-17-ASH	B	Aqueous	80	490	0.181	8.3
4-18-ASH	B	Aqueous	80	240	0.187	2.7
4-19-ASH	B	Aqueous	70	470	0.182	3.8
4-20-ASH	B	Aqueous	60	480	0.185	3.3
4-21-ASH	B	Aqueous	70	240	0.178	2.8
4-22-ASH	B	Aqueous	90	240	0.176	3.1

Notes:

(a) Cartridge A: Extraction section; stainless steel nozzle plates, 1/8-in.-diameter holes, 23% free area on 2-in. plate spacing. Scrub section; alternate sets of 2 stainless steel and 2 fluorothene sieve plates on 1-in. plate spacing. Stainless steel plates - 0.08-in.-diameter holes, 21% free area. Fluorothene plates - 1/8-in.-diameter holes, 23% free area.

Cartridge B: Extraction section; graded plate cartridge. Scrub section; stainless steel sieve plates, 1/8-in.-diameter holes, 23% free area on 2-in.-plate spacing.

(b) Defined as $\frac{\text{Cl}^- \text{ concentration in scrub section influent organic}}{\text{Cl}^- \text{ concentration in scrub section effluent organic}}$

The scrub section influent organic chloride concentration was assumed to be 1 g./l.

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TABLE II

PUREX 3-IN. 2D EXTRACTION COLUMN EFFICIENCY STUDIES

Flowsheet: Purex Plant Flowsheet #2. Pu and F.P.'s omitted. Shell E-2342 diluent.

Equipment: Dual-purpose column with a 3-in.-diameter, 9-ft.-high precision bore glass extraction section and a 4-in.-diameter, 8-ft.-high standard bore scrub section. Cartridges are specified in the notes.

Pulse Amplitude: 1.0 in. in the extraction section.

Volume Velocity: 500 ± 10 gal./ (hr.) (sq.ft.), sum of both phases.

Run No.	Cartridge (a)	Time From Start of Run, Hr.	Pulse Frequency Cyc./Min.	L/V, Aq./Org. Flow Ratio	% U Loss
4-14-ASH	A	4	100	0.482	0.24
		8	100	0.475	6.45(b)
		12	100	0.456	0.12
		14	100	0.435	0.039(b)
		18	90	0.501	12.7(c)
		22	90	0.425	0.025
		26	90	0.428	0.018
		30	90	0.455	0.025
4-15-ASH	B	4	80	0.471	0.12
		8	80	0.470	0.13
		12	80	0.445	6.20(d)
		16	80	0.471	1.49

Notes:

- (a) See note (a) of Table I.
- (b) Approximately 6 hours after the start of the run, the column dispersion in the extraction section tightened and a cyclic coalescence started which continued until the frequency was reduced from 100 to 90 cycles per minute 14 hours after the start of the run.
- (c) The 2DX rate fell off to approximately 20% of flowsheet value, one-half to three-quarters of an hour before these samples were taken.
- (d) The dispersion loosened sharply approximately 9 hours after the run was started and the color line disappeared. Throughout the rest of the run the color line was gradually rising.

URANIUM RECOVERY DEVELOPMENTProcess Chemistry

Semi-Continuous Calciner Runs. Preliminary runs employing (1) recrystallized UNH feed and (2) plant UNH feed with formaldehyde addition via separate feed point was tentatively reported last month to give a reactive product (reactivity ratio of one measured at a reduction temperature of 925 and a hydrofluorination temperature of 600°C.) Further runs employing formaldehyde addition have consistently given a product with a reactivity ratio of 0.85. An additional run with recrystallized UNH feed (low in metallic-ion content) gave a product with a reactivity ratio (925-600) of 0.95. A run made with plant UNH feed and with stoichiometric formic acid added (for reaction with nitrate) via a separate feed point produced a powder with a reactivity ratio (925-600) of 0.76.

Reduction with Ammonia. A number of hydrofluorination runs were made in the thermo-balance to determine any effect on subsequent hydrofluorination rates of using NH_3 (vice H_2) as the reductant. Both continuous and pot-type powders were investigated. The data obtained indicate that continuous powder reduced at 800 to 925°C. for two hours with ammonia exhibits a more rapid hydrofluorination rate than hydrogen reduced pot powder when a low (400°C.) powder temperature is maintained during hydrofluorination. The converse is true when the hydrofluorination temperature is increased to 500°C. The hydrofluorination rate of pot-type powders is also increased when ammonia rather than hydrogen is used as the reductant. Data obtained on powders reduced at 925°C. are shown below.

RATE OF HYDROFLUORINATIONTime Required for 90 and 98% Conversion (Minutes)

Powder*	600°C HF		500°C HF		400°C HF	
	98%	90%	98%	90%	98%	90%
1. Continuous powder P-292. Reduced with NH_3 .	102	55	68	35	34	10
2. Continuous powder P-292. Reduced with H_2 .	-	-	120	56	-	-
3. Paducah pot powder. Reduced with NH_3 .	26	14	23	10	-	-
4. Paducah pot powder. Reduced with H_2 .	42	21	39	15	40	18
5. MCW pot powder. Reduced with H_2 .	65	34	61	26	74	43

* Reduced two hours at 925°C.

The beneficial effect of reduction with ammonia is also evident at low reduction temperatures. For example, continuous powder P-292 reduced at 590°C. with (1) hydrogen and (2) ammonia required 114 and 20 minutes, respectively, for 98% hydrofluorination at 600°C.

Previous work has indicated that the results obtained with NH_3 are not duplicated when N_2 diluted H_2 is used as the reductant. Following completion of the work with NH_3 , a similar study will be made using CO as the reducing agent.

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WASTE TREATMENT

Process Chemistry

Co^{60} in Uranium Recovery Process Wastes. Precipitation of ammonia complexes of Co (III) with ferrocyanide was reported last month to give favorable cobalt decontamination factors ($>10^3$) with synthetic stored wastes under conditions applicable to in-farm scavenging. Numerous experiments with stored plant wastes have been uniformly unsuccessful in achieving any significant cobalt decontamination.

Preliminary experiments on stored plant wastes utilizing the carrying of Co^{60} by inert CoS have shown considerable promise of giving adequate cobalt decontamination. Under all conditions tried to date the method is successful only if the pH of the waste solution is lowered to about 1.5 prior to the precipitation of CoS. Further evaluation of the method is in progress.

Work with current plant wastes indicates that adequate cobalt decontamination may be obtained by a double cobalt strike procedure. The first cobalt addition is made to the acid waste (perhaps by addition to the RDIS) and a second addition made just after neutralization. The second cobalt strike appears to bind the ammonia present in the waste and thus inhibit the metathesis of the cobalt ferrocyanide which carries most of the Co^{60} . This work is continuing to determine optimum conditions compatible with existing plant equipment.

Chemical Engineering Development

Cesium Recovery. "Cold" pilot plant studies of a cesium recovery flowsheet have been pointed towards the removal of iron from neutralized LWV by centrifugation in a 26-inch solid-bowl baffled centrifuge operating at 1100 x G. In all the runs, the LWV (7.6 M HNO_3 , 0.11 M $\text{Fe}(\text{NO}_3)_3$, 0.2 M Na_2SO_4) was neutralized to 0.1 to 0.3 M HNO_3 with 50 per cent caustic. The final neutralization and precipitation at a pH of 2.5 to 3.5 was carried out with urea or with an ammonia - air mixture. The precipitation conditions and the centrifugation results are tabulated below:

<u>Precipitant</u>	<u>Precipitation</u>		<u>Centrifugation</u>	
	<u>Temp. °C.</u>	<u>Time, Min.</u>	<u>Hold-Up Time, Min.</u>	<u>Fe Removed, %</u>
0.75 M Urea	100 ± 5	130	6.7	99.99
			5	99.7
NH_3 - Air ⁽¹⁾	93 ± 3	80	7.4	99.7
			4.7	99.4
NH_3 - Air ⁽²⁾	96	155	5.3	(3)
			3.3	(3)

Notes:

- (1) Thirteen cubic feet per minute of 3 volume per cent NH_3 in air.
- (2) Thirteen cubic feet per minute of 1 volume per cent NH_3 in air.
- (3) Laboratory results not available at time of writing but the iron removal is believed to be better than the previous NH_3 - air run.

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The volume of precipitate formed under the above conditions was about 1.5 per cent of the solution volume as compared to 9 per cent with NaOH precipitation.

The centrifuge cake had a tendency to adhere to the bowl wall. With urea precipitation, the cake could be removed by slurrying but with the NH_3 - air precipitation, 30 per cent HNO_3 was required to loosen the cake. The slurry (0.6 M in iron) was easily removed from the centrifuge with a 3 gpm steam jet.

MISCELLANEOUS DEVELOPMENT

Chemical Engineering Development

Centrifugation of Dissolver Solution. In order to test the efficiency of centrifugation for separation of solids from continuous dissolver solution, the solution from the recent series of mercury catalyzed "cold" dissolver studies performed in the 321 Building were centrifuged at 1100 x G in a 26-inch solid-bowl baffled centrifuge. The centrifuge feed was 2 M U, 0.22 to 3.3 M HNO_3 , 0.4 M ANN, had a specific gravity of 1.71 to 1.76, and contained only the very fine solids carried from the dissolver to the overflow pot during continuous operation. Solids removal was found to be a function of the hold-up time in the centrifuge as indicated by the following table:

<u>Hold-Up Time, Min.</u>	<u>Solids Removed, %</u>
17.2	About 90
10	65
6	55
4	50
3.2	33

The cake skim contained solids about equal to the amount in the centrifuge feed. The solids did not tend to adhere to the bowl wall and were easily jetted out of the centrifuge with a 3 gpm steam jet.

Separations Equipment Development

In-Line Chemical Instrumentation

Nitric Acid by pH. The determination of nitric acid, in a synthetic Redox HAIS stream, by direct pH measurement was proven feasible in Cold Semiworks tests. The pH values recorded for a fixed aluminum nitrate (ANN) concentration indicate a precision of about 1 gm./liter nitric acid in the range 0 to 20 grams/liter acid deficient. Difficulties with the high concentration ANN salt (930 gm./liter) plugging the sample jet were overcome by bleeding a small amount of water (1 gal./day) into the jet inlet.

Gamma Monitor Cells. A total of six gamma monitor cells were contacted with contaminated organic solutions from the Hot Semiworks. The per cent of the gross solution activity adhering to the surface of the cells after four days contact is shown in the tabulation below.

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Fluorothene coating on aluminum	-	50%
Glass	-	49%
Fluorothene coating on glass	-	35%
Flame-sprayed polyethylene	-	28%
Molded fluorothene	-	26%
Molded polyethylene	-	25%

These data show that molded polyethylene and molded fluorothene have equally low surface retention of fission products, however, the fluorothene is superior structurally. Further tests with higher activity solutions followed by decontamination are underway.

Instrumentation Manual. The Operation and Maintenance Manual, In-Line Analytical Instruments, Purex Plant, HW-41093 was issued during July. The manual describes the operation and maintenance of:

- (1) Gross Gamma Scintillation Monitors.
- (2) Gamma Scintillation Monitor for Iodine¹³¹.
- (3) pH Measuring System.
- (4) Plutonium Gamma Absorptometer.

Plant Assistance. The plutonium gamma absorptometer operated until Purex Plant shutdown. On startup, an attempt by Operations to free a valve in the line downstream of the monitor caused loss of sensitivity probably due to a slight turning of the thulium source in the source holder. The monitor will be restored to service during the next plant shutdown.

The Prototype Iodine¹³¹ scintillation gamma monitor failed when the differential analyzer overheated. The steel shelves in the instrument cabinet were removed to permit air circulation, and a blower was installed. These changes should minimize future difficulties due to overheating of the electronics.

Plug Piston Pulse Generator. The 4-inch-diameter graphite plug-piston pulser has operated 14 million cycles. Water loss from the 3-inch column (including evaporation) averaged less than 4 ml./hr. during the past month. Inspection of the pulser at 13 million cycles showed no additional wear of the piston, cylinder, and Teflon packing since the last inspection (10^7 cycles). The hardened 17-4PH stainless steel shaft and Polypenco K51 throttle bushing, both installed at 10^7 cycles, were not corroded or worn. A helium purge was used instead of an air purge during the operating period between inspections (10^7 to 1.3×10^7 cycles).

Water losses from the column dropped to less than two ml./hr. during the last 10^6 cycles (1.3×10^7 - 1.4×10^7) despite an increase in static head at the piston from 12 to 17 ft., with stroke and frequency remaining constant, 7/8-in. and 120 cyc./min., respectively. Air replaced helium as the gas purge medium during this time. According to calculations, losses by evaporation may be as high as 0.75 ml./hr.

[REDACTED]

A graphite plug-piston pulser has operated 4 million cycles pulsing water in the IO Column (static head - 20 ft.). Column liquid levels, as determined by diptube measurements, have not changed. Piston stroke and frequency are 0.8 in. and 100 cyc./min. The air purge rotameter indicates zero flow with a supply pressure of 15 lb./sq.in. gauge.

Johnston 7 BS Pump. This multistage deepwell turbine pump, equipped with a Polypenco K-51, a chlorinated polymer, liquid throttle bushing and a Type 304-L stainless steel conical liquid deflector, has been operated intermittently. A total running time of 30 hours has been logged since installation. The pump has been used for transferring supernate and slurry in the 321 Building Underground Waste storage tanks. The same pump failed after 36 hours operation when it was equipped with a graphite throttle bushing and a deflector was not employed. Use of the new liquid throttle bushing material and the deflector has resulted in a 90% decrease in seal leakage.

3 Horsepower Chempump. A canned motor pump was inspected after 396.4 hours of operation pumping water at 12 GPM against a head of 83 feet. The Polypenco K-51 bearings and stainless steel journals had worn up to 37 mils. This was enough wear to permit contact between the stator and rotor cans. Scoring and abrasion of both the stator and rotor resulted. Without extensive modifications involving basic design changes of the bearings, shaft, bearing housings, pump casing and motor end-bell, little chance exists that this pump will operate satisfactorily. In view of this, testing of this unit has been discontinued.

Milton Roy Mersemetric. Final inspection of the submerged, reciprocating plunger pump was completed after 5551.6 hours of operating, using 94 C. water as the test fluid. The pump was operated at a flow rate of 80 ml./min. against a head of 32 feet. As previously reported, the flow was erratic - varying from 10 to 100 ml./min. as the check valves fluttered or refused to seat properly. Severe wear (up to 32 mils) was found at the externally mounted bronze guide bushing and up to 4.5 mils eccentric wear of the submerged Purebon P-4 lower guide bushings, while the displacement plunger was worn to a taper of from 24 to 37 mils by the Teflon packing.

Gold Gasket. A gold gasket was successfully tested in a 1/2-inch pipe flange with 90 psig internal hydrostatic pressure. Twenty foot-pounds torque on the flange bolts was necessary to effect a complete seal. The gasket was made from fine gold (24K) wire 0.081-in. in diameter, closed into a ring by inert gas arc welding, and annealed to dead softness. The gold readily flowed into pits, grooves, and radial scratches in the welded stainless steel slip-on type flange faces. The corrosion resistance of gold-gasketed stainless steel piping, exposed to separations process solutions, is under investigation.

Radiation Stability. Samples of Polypenco K-51 irradiated to 10^7 R had a modulus of elasticity about 10 per cent greater than unirradiated samples. No other change in the material was noted.

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CHEMICAL RESEARCH SUB-SECTION,

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Miniature Mixer-Settler Studies

A run testing the decontamination performance of a low-acid precycle flowsheet on feed prepared from Purex dissolver solution was completed during the month. Decontamination data obtained are summarized in Table I. For comparison, results are included for a high-acid precycle run completed last month.

TABLE I

PRECYCLE DECONTAMINATION

Low-Acid Flowsheet:

HAF: 1.7 M U, 0.83 M HNO_3	Flow: 100
HAS: 2.0 M HNO_3	Flow: 67
HAX: 30% TBP in Shell E-2342	Flow: 445

High Acid Flowsheet

HAF: 1.35 M U, 2.0 M HNO_3	Flow: 100
HAS: 3.0 M HNO_3	Flow: 67
HAX: 30% TBP in Shell E-2342	Flow: 366

Decontamination Factors

<u>Zr-Nb</u>	<u>HAF to HAP</u> <u>Ru</u>	<u>Total Gamma</u>	<u>Zr-Nb</u>	<u>HAF to HCP</u> <u>Ru</u>	<u>Total Gamma</u>
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Low Acid Flowsheet

6000	890		15,000	1300	
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High Acid Flowsheet

2300	900	ca. 3000	6,400	1600	7000
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Better extraction section decontamination is responsible for the two-fold greater overall zirconium-niobium decontamination observed with the low-acid flowsheet. The ruthenium profiles were identical for these two flowsheets. However, it should be noted that the decontamination factors observed for ruthenium in these runs are lower by a factor of about 2.5 than the values which were customarily observed in earlier work employing Hot Semi-Works dissolver solution as feed.

Second-cycle runs comparing low and high acid 1A column flowsheets are in progress, employing as feed the product of the low-acid precycle run.

Preliminary results indicate satisfactory decontamination for both flowsheets. The products from both second cycle runs were below the gamma spectrometer detection limit.

Profile Pulse Column Studies

Runs employing a new batch of Purex 2DF confirmed the existence of filterable activity capable of limiting decontamination of this feed. On processing this feed in the 1-inch profile pulse column with the "standard" stainless sieve-plate cartridge and top interface, it was found that the activity-bearing "cruds" refluxed in the scrub section, apparently rising with the organic droplets and then redispersing into the aqueous phase as the organic coalesced at the column interface. This reflux resulted in a "saddle-shaped" aqueous phase gamma profile peaking at the feed plate and at the column interface. After only 3.5 hours operation, the gamma activity in the aqueous phase immediately below the interface was seven times that of the 2DF feed solution. Decontamination from "soluble" activity was quite adequate in this run. The gamma activity of the organic uranium product was below that of aged natural uranium after the samples were clarified by settling or centrifugation. Centrifugation of the aqueous phase removed from a point immediately below the column interface reduced the gamma activity of this solution by a factor of about three.

Similar effects were noted in a run employing a "Zebra" scrub cartridge (alternating pairs of stainless and fluorothene sieve plates) in conjunction with a standard stainless sieve plate extraction cartridge. In this run the interface was maintained at the middle of the column, immediately above the feed entry point. Reflux of the activity-bearing "cruds" led in this run to establishment of a gamma activity level five-fold higher than the feed activity in the aqueous at a point three plates below the feed plate. Again, centrifugation of this aqueous reduced its activity by a factor of about three.

A run was also made in which this batch of plant 2DF was processed through a nozzle plate cartridge operated organic continuous (bottom interface). The "cruds" appeared to have been largely diverted to the waste in this run, but entrainment of aqueous phase in the organic product was excessive and limited decontamination. Entrained aqueous separated from the organic product in this run showed a gamma activity about 1.4 times that of the 2DF.

The decontamination behavior of these cartridges was also compared with synthetic feeds prepared from zirconium tracer. The HTU values for zirconium in the scrub section were about 1.0 foot for the standard cartridge operated aqueous continuous and about 1.3 feet for the nozzle plate cartridge operated organic continuous. The most efficient scrub performance observed in these runs occurred in the first run employing the Zebra cartridge. In this run the scrub section consisted of

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alternate aqueous continuous and organic continuous regions, the stainless plates operating aqueous continuous and the fluorothene plates organic continuous. A scrub HTU value of 0.75 feet was observed for zirconium in this run. Attempts to repeat this run have been unsuccessful, however. All surfaces in the column appear now to be preferentially wetted by the organic with the result that the Zebra scrub cartridge can be operated with a middle interface only as an organic-continuous column. This type of operation is less efficient, yielding a scrub HTU value for zirconium of about 1.75 feet. Entrainment of aqueous in the organic product limited decontamination in this run as in the run with the nozzle plate cartridge.

From these results it appears that organic continuous, bottom interface operation is probably more favorable for "crud control" but that the aqueous continuous standard cartridge is as good or better than the organic continuous cartridges for scrubbing soluble zirconium.

Zirconium Chemistry

A number of successive scrubbing experiments were performed in an effort to determine if "unscrubbable" zirconium species exist which limit zirconium decontamination in a Purex solvent extraction cycle. Zirconium tracer isolated from dissolver solution by extraction with TTA was employed as feed. Organic feeds were prepared by contacting aqueous tracer solutions with 30 percent TBP in various diluents. The aqueous scrub solution used in the successive scrubbing operations was 4.0 molar nitric acid. In certain of the experiments uranium was present at a concentration of 0.075 molar in the organic phase throughout the scrubbing operation. Six scrubbing contacts were normally made.

In six experiments employing Shell E-2342 as diluent an essentially constant scrub distribution coefficient of 0.3 to 0.4 was observed for zirconium until the zirconium activity in the organic phase had been reduced to approximately 10^5 c/m,ml. At this point the distribution coefficient began to increase, reaching values of the order of 1.6 after additional scrubs had reduced the zirconium level to 10^4 to 6×10^4 c/m,ml.

Further investigation disclosed that the bulk of this unscrubbable zirconium could be stripped. It was further found that the high distribution coefficients observed for the "unscrubbable" zirconium decreased with time, approaching the initial value of 0.3 to 0.4 after storage of the separated organic solutions for periods of the order of two days.

Some fractionation of zirconium species was apparently accomplished by these successive scrubbing experiments as indicated by the fact that the zirconium scrubbed into the aqueous phase exhibited a distribution coefficient of 0.3 to 0.4 when these aqueous solutions were recontacted with virgin organic. For example zirconium in the aqueous phase resulting from a scrub contact in which the zirconium showed a distribution coefficient of 3.6 showed a distribution coefficient of 0.36 when this aqueous was recontacted with fresh organic.

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A successive scrubbing experiment in which the initial zirconium concentration was reduced by a factor of ten showed that fewer successive scrubs were required to reach a point where zirconium distribution ratios began to increase, this occurring again at about 10^5 clm/ml.

These results suggested that the "unscrubbable" zirconium species represented a complex of zirconium with an impurity present in very small concentration. On the supposition that this impurity might originate from the Shell E-2342 diluent successive scrubbing experiments were performed employing other diluents. No such effect was observed when carbontetrachloride was used as the TBP diluent and the effect was much less pronounced when Soltrol 170 was used as the diluent.

A successive scrubbing experiment was also performed in which Purex dissolver solution was employed as the feed source. In order to reduce uranium back-salting effects the dissolver solution was diluted ten-fold with nitric acid prior to the extraction step. Shell E-2342 diluent was employed in this experiment and the successive scrubs performed at conditions identical with those used in the tracer experiments. Extraction coefficients measured for zirconium were 0.09 in the extraction step and 0.25, 0.33, 0.38, and 0.41 in the first, second, third, and fourth scrub steps, respectively. Unfortunately, the experiment was terminated at a residual organic zirconium level of 1.5×10^5 clm/ml, or about the level at which increasing distribution coefficients were observed in the tracer experiments.

Further studies of this effect will be primarily concerned with evaluation of the effect of uranium and the probable implications of this effect in plant operations.

The lower distribution coefficient observed for zirconium in the extraction step as compared with the scrub steps in the experiment employing Purex dissolver solution confirms earlier results and is the topic of current investigations.

Stannous Oxide Head End

A brief experimental study was made to determine the feasibility of employing ascorbic acid as a reductant to maintain plutonium(III) and thus decrease plutonium carrying in a stannous oxide head end operation. The lifetime of ascorbic acid proved too short under the high temperature conditions required for adequate fission product decontamination, however.

An additional full-level scavenging study was made to determine the effect of stannous oxide concentration on decontamination but analytical data are not yet available.

Adsorption of Activity from Organic Streams

Scouting studies reported last month indicated a decontamination factor of about eleven could be obtained on passing a synthetic organic solution (59 g/l uranium, 0.14 g/l nitric acid, 2.36×10^5 gamma c/m,ml) simulating a Pu-238 LBU through a column packed with silica gel and alumina. Further investigation showed this

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effect to be due entirely to silica gel, alumina having only a very low capacity for adsorption of fission products in the presence of uranium.

The same synthetic LBU was fed to a column packed with uranyl phosphate prepared by reacting uranium trioxide with ammonium dihydrogen phosphate at 300 C for seven hours. The capacity of this column was found to be in excess of 263 column volumes, the volume which had passed through the column when the feed was exhausted. The uranyl phosphate was observed to undergo a color change progressing from top to bottom of the column and becoming complete at 100 column volumes. This color change was accompanied by a slowing in flow rate through the column and an increase in decontamination as a result of the reduced flow, from a factor of 8 to 10 during the first one hundred column volumes to 18 at 263 column volumes.

Additional evidence that this adsorption process is rate limited was obtained by increasing the temperature. A second column operated at 67 C yielded a decontamination factor of 23 when the synthetic LBU was passed through it at the same rate which resulted in a decontamination factor of 8 to 10 with the first column at room temperature.

Batch equilibration studies confirmed that this exchange(?) process is slow at room temperature. From one to 1.5 hours were required to establish equilibrium when 50 milliliter samples of an organic solution containing zirconium tracer were agitated vigorously with 0.2, 0.4, or 0.8 gram portions of uranyl or uranous phosphate. Decontamination factors at equilibrium ranged from 50 to 200.

Bismuth phosphate was prepared in the same fashion by reaction of bismuth(III) oxide with ammonium dihydrogen phosphate. Batch equilibration of this material with an organic zirconium-niobium tracer solution gave decontamination factors of 25 to 150 with times in excess of one hour being required to establish equilibrium.

WASTE TREATMENT AND FISSION PRODUCT RECOVERY

Cesium Recovery from Purex Waste

A series of full level cesium precipitation experiments were carried out with 200 MWD/T Purex plant IWW solution. These were aimed primarily at testing the radiation stability of the zinc cesium ferrocyanide precipitation step as well as evaluating the performance of the flowsheet on actual, rather than simulated, plant material. Although analyses are not complete, the preliminary results appear very satisfactory and correlate well with the tracer level work.

Precipitations were carried out with 2×10^{-4} M zinc ferrocyanide over the pH range 1 to 8. The IWW was first neutralized with sodium hydroxide to pH 10 or 11 to remove iron and uranium and the supernate then acidified to the pH chosen for ferrocyanide precipitation. In some cases a white gelatinous precipitate, identified as aluminum hydroxide, formed during this acidification and was removed by centrifugation prior to ferrocyanide addition. Cesium recovery was only about 50 percent at pH 1 but equalled, or exceeded, 90 percent for the pH range 2 to 8. The

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precipitates were allowed to stand in contact with the supernatant solutions and the latter sampled as a function of time to determine radiation stability. No significant decomposition was noted for periods of up to one week, a length of time far in excess of that which would be involved in normal plant operation. Nor was any cesium activity leached from the precipitates by water washing after a week's aging. The experiments will be repeated with 600 MWD/T plant solution as soon as this material can be obtained.

Ruthenium was the only significant radiochemical impurity found in the zinc cesium ferrocyanide product and contributed a gamma activity about one tenth that of the cesium. Washing the precipitate with 1 M nitric acid removed most of this ruthenium but also removed about ten percent of the cesium, resulting in a product of high purity but of somewhat reduced yield. Water, alone, was ineffective in removing ruthenium.

In addition to the above full level demonstrations, a series of tracer experiment. were performed with synthetic neutralized IWW supernate to further evaluate the effect of iron and uranium on ferrocyanide scavenging. The results are shown in Table II.

TABLE II

EFFECT OF ION AND URANIUM ON CESIUM
SCAVENGING WITH ZINC FERROCYANIDE

Synthetic neutralized IWW supernate,
indicated additive, tracer cesium,
 2×10^{-4} M zinc ferrocyanide scavenger.

<u>Additive</u>		<u>Cesium Recovery, Percent</u>			
<u>M Iron</u>	<u>M Uranium</u>	<u>pH 0</u>	<u>pH 2</u>	<u>pH 6</u>	<u>pH 8</u>
0	0	75	90	96	96
10^{-4}	0	23	48	98	98
10^{-3}	0	17	15	97	98
10^{-2}	0	0	15	76	71
0	10^{-4}	75	85	94	94
0	10^{-3}	79	63	91	92
0	10^{-2}	5	0	92	91

It will be noted that interference is minor at the higher pH's; however, precipitated iron and uranium, if present, would bulk up the precipitate and reduce specific activity. Other experiments are in progress to investigate the effect of aluminum (from continuous slug dissolution) and ammonium ion (from urea hydrolysis) on cesium recovery. Application of zinc ferricyanide to Purex IWW is also being investigated because of the very favorable results obtained on aluminum containing Redox waste.

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Work on the calcination - chlorination reaction has been scaled up and extended to include material prepared in the 321 Building. The latter was found to be contaminated with gross amounts of ferric ferrocyanide, probably from corrosion of steel process equipment, and spattered badly during calcination. The cause of this difficulty has not been entirely resolved.

Although the present flowsheet envisages packaging of the cesium as the mixed oxide - chloride product obtained from the calcination - chlorination operation, it is considered of interest to determine the radiation stability of the ferrocyanide itself. A sample of zinc cesium ferrocyanide (321 Building material) is accordingly being irradiated in the cobalt 60 facility, and the rate of gas evolution is being measured as a function of time.

Cesium Recovery from Redox HAW

Work on the recovery of cesium from Redox HAW by scavenger precipitation of zinc ferricyanide was continued. This waste is typified by a high aluminum nitrate concentration (1.27 M), by the presence of lower concentrations of a variety of other ions including dichromate, sulfate, iron(III), chromium(III) and uranium, and by a somewhat lower cesium concentration than in the Purex IWW. The effects of acidity, time and temperature of digestion, use of pre-formed versus co-formed precipitant, and a tentative scheme for recovery of pure cesium from the precipitate were reported last month. The effect of additional variables, and further work on the isolation step, are reported below.

The effect of zinc ferricyanide concentration was investigated over the range 10^{-4} to 0.02 M, the solutions in each case being 0.3 M acid deficient and containing 10^{-4} M inert cesium traced with cesium-137. No precipitate, or cesium removal, was observed for concentrations less than 0.0004 M. Decontamination factors at 0.0008, 0.001, 0.002, and 0.004 M zinc ferricyanide were 9.8, 62, 399, and 272, respectively, and did not increase further at higher concentrations. The precipitate volume was 0.2 percent at 0.0008 M and one percent at 0.004 M.

The effect of cesium concentration at constant (0.001 M) zinc ferricyanide was investigated in another series as shown below.

TABLE III

EFFECT OF CESIUM CONCENTRATION ON ZINC FERRICYANIDE SCAVENGING

Synthetic Redox HAW, scavenged at R.T. with
0.001 M co-formed $\text{Zn}_3 [\text{Fe}(\text{CN})_6]_2$

<u>M Cs</u>	<u>Cs DF</u>
5 x 10^{-6}	135
10^{-5}	203
5 x 10^{-5}	72
10^{-4}	303
5 x 10^{-4}	24
10^{-3}	2.1
5 x 10^{-3}	1.2

From these results it is seen that zinc ferricyanide in excess of 0.001 M would be required to effectively scavenge higher concentrations of cesium. It may also be tentatively concluded that about 0.5 to 1 mole of cesium per mole of zinc ferricyanide is required to saturate the precipitate.

The effect of excess zinc or ferricyanide over that corresponding to the stoichiometry of the formula $Zn_3 [Fe(CN)_6]_2$ was also observed. Although a slight (50 percent) excess of ferricyanide appeared to be beneficial, a large excess of either zinc or ferricyanide resulted in very poor cesium removal. Thus, a ten fold excess of ferricyanide reduced the cesium decontamination factor from a value of 220 to 6.6, and a seven fold excess of zinc gave a value of 3.5.

Multiple scavenging and isotopic dilution are illustrated in Table IV. It will be

TABLE IV
MULTIPLE SCAVENGING OF REDOX HAW
WITH ZINC FERRICYANIDE

0.001 M co-formed zinc ferricyanide employed
unless otherwise noted. 10^{-4} M inert cesium
isotopic diluent added prior to second scavenging
as noted. All R.T.

1st Scavenge	Cesium DF			Isotopic Dilution
	2nd	3rd	Cumulative	
9.8*	839		8.2×10^3	Yes
62	317		2×10^4	No
64	25		1.6×10^3	No
86	118	10	10^5	No
399**	75**		3×10^4	Yes
69	148		1.1×10^4	Yes
* 0.0008 M $Zn_3 [Fe(CN)_6]_2$				
** 0.002 M $Zn_3 [Fe(CN)_6]_2$				

noted that the decontamination factors hold up through at least two successive scavenging operations giving overall decontamination factors of the order of 10^3 to 10^4 . Addition of inert cesium in the second scavenging does not appear to be of any particular benefit.

The effect of aluminum nitrate concentration was investigated over the range 0.5 to 2.5 M. Using 0.001 M co-formed zinc ferricyanide, it was found that the amount of precipitate formed and the extent of cesium removal both became negligibly small as the aluminum concentration was decreased to half molar. Cesium decontamination also declined at high aluminum concentrations, perhaps due to competition with aluminum for absorption sites in the precipitate. Optimum scavenging was in the range from about 1 to 1.6 M aluminum nitrate.

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Further work has been done on the isolation process. A troublesome residue is often left behind, or forms from solution, when the zinc ferricyanide is dissolved in ammonium hydroxide. This material is believed to be ferrocyanide and represents a loss of several percent of the cesium. It is rendered soluble in ammonia by treatment with fuming nitric acid. The amount formed is minimized by excluding light and carbonate and by dissolving the ferricyanide in cold, rather than hot, ammonia. Holding oxidants, such as chlorate, iodate, or periodate, were ineffective in preventing formation of the precipitate.

The anion resin Dowex 1-X2 (chloride form) was found very effective in removing ferricyanide from ammonia solution. However, no satisfactory way has been found to regenerate the resin. It will apparently have to be discarded when it becomes saturated. The cation resin Duolite CS-101 (hydrogen form), was shown to remove zinc from the eluate ammonia solution and was readily regenerated with hydrochloric acid.

Strontium Removal from Purex Waste

Major effort this month was directed at testing the strontium and cesium recovery portions of the chemical flowsheet which was employed (HW-43835, The Isolation and Packaging of Fission Products at Hanford, R. E. Tomlinson, June 27, 1956) for study purposes in the recent feasibility study. As a result, several difficulties were discovered which will require further investigation. Thus, the carrying of strontium by calcium carbonate gave rather erratic results, and the overall recoveries, starting with synthetic IWW, were low. These averaged only 25 to 40 percent overall. It was also found that the oxalate separation of strontium from rare earths is complicated by precipitation of uranyl oxalate. This occurs when the IWW uranium concentration exceeds 0.017 M. A plant sample was found to analyze 0.036 M. Although this solution can be handled successfully by a two fold dilution, this would increase waste volumes unduly. A more satisfactory separation from uranium is being sought.

Lead(II) carbonate was tested as a strontium carrier. It was suspected from ionic size considerations that it would prove superior to either barium or calcium; however, this was not found to be the case. Only 50 percent carrying was obtained with lead under conditions such that barium removes 70 percent.

In other experiments, the uranium present in plant IWW (about 0.04 M) was found to carry strontium efficiently when the solution was neutralized to a pH of about 12. Addition of ferric carrier at this point was, therefore, not required. Phosphate, at a concentration of 0.01 M, was found to have no detrimental influence on carrying of strontium either on ferric hydroxide (pH 5 to 6) or on calcium carbonate (high pH).

Sulfate is present in current plant IWW due to pooling of first and second cycle Purex wastes. Furthermore its presence interferes with the use of barium carbonate as a carrier for strontium (as a consequence of the low solubility of

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barium sulfate). The path of sulfate in ferric hydroxide precipitation was accordingly investigated. Precipitation with caustic, urea, and gaseous ammonia at pH's of 12 to 13, 4.6, and 3.4 respectively yielded washed precipitates containing 26, 12, and 4.3 moles of iron per mole of sulfate. This behavior is believed to be a function of the terminal pH's rather than of the different precipitants used and to reflect the formation of basic sulfates at low pH. These would presumably be converted to the oxide at higher pH.

The rate of urea hydrolysis in IWW solution was also studied. The first order rate constants were found to average only about 25 percent lower than literature values obtained in hydrochloric acid and sodium hydroxide solutions under more nearly ideal conditions. Although the ferric hydroxide precipitated by urea hydrolysis consists of fine granular particles (and has been termed "crystalline"), x-ray diffraction showed it to be amorphous, as was the ferric hydroxide precipitated with sodium hydroxide and gaseous ammonia.

Solvent Extraction Behavior of Ruthenium

An equation was reported several months ago (HW-42219-H, p. 55) for describing the variation of the gross extraction coefficient of a trace element when successive solvent extractions are performed under conditions such that no change occurs in the concentrations of the macro constituents, i.e., the acidity, percent organic saturation, etc. A rather similar equation has now been derived to describe the successive scrubbing of the organic resulting from the first extraction. This is as follows:

$$E_n^T = \frac{\sum_{i=1}^X R^{n-1} f_{i,o}^o \left(\frac{E_1}{1 + RE_1} \right)^n}{\sum_{i=1}^X f_{i,o}^o \frac{(RE_1)^{n-1}}{(1 + RE_1)^n}}$$

where E_n^T is the total extraction coefficient (O/A) after the n th scrub R is the volume ratio (organic to aqueous), $f_{i,o}$ is the fraction of the total ruthenium present in the organic as the i th species before scrubbing. On successive scrubs, E_n^T approaches the distribution coefficient of the most extractable species, whereas on exhaustive extractions it would, of course, approach that of the least extractable. The two equations thus compliment each other and should yield the same information regarding species; however, the scrubbing type experiment should be the most sensitive for detecting small concentrations of organophillic species.

Extraction and scrub experiments employing these techniques are being carried out on Hanford dissolver solutions. After determining the fraction of the ruthenium present in different species and the extraction coefficients of these species, the latter numbers will be compared with those for known (macro) ruthenium compounds

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in an effort to identify the dissolver solution species. It is hoped that study of the chemistry of the macro compounds will afford ways of controlling the fission product species.

In connection with the work on the macro ruthenium compounds, it has been necessary to develop an analytical method for ruthenium in organic (TBP) solutions. A method which looks promising involves the addition of an organic sample to filter paper followed by ignition of the latter. The resulting ruthenium oxide is then fused with a potassium hydroxide - potassium nitrate mixture to form the ruthenate. The latter is dissolved in caustic and determined spectrophotometrically. Although creeping of the salt during fusion causes some difficulty in reproducibility, it is hoped to overcome this with a different heating system.

Zirconium Isotopic Dilution Experiments in 3 M Nitric Acid

Thirty percent TBP in Soltrol, equilibrated with 3 M HNO_3 and containing Zr-95 tracer, was contacted with 3.0 M HNO_3 - Zr(IV) solutions for 15 minutes. The phases were separated by centrifugation, and samples of each counted to determine the distribution of tracer activity. Preliminary experiments indicated that ten minutes should be a suitable contacting time and that an equilibrium distribution ($\pm$ 10 percent) could be attained starting with tracer zirconium in either phase. The data of Table V indicate the same behavior as that for 6 M HNO_3 (HW-43938-H,

TABLE V

EFFECT OF ISOTOPIC DILUTION ON ZIRCONIUM DISTRIBUTION

Aq: 3 M HNO_3 , indicated M Zr(IV).
Org: 30 percent TBP Soltrol, tracer Zr*.
Equal volume contactings, room temperature.

<u>Initial</u> <u>Aqueous Zr Conc. (M)</u>	<u>Zr*Ea</u>
0	0.30
1.1×10^{-4}	0.34
2.2×10^{-4}	0.29
7.0×10^{-4}	0.35
1.1×10^{-3}	0.30
3.2×10^{-3}	0.21
6.4×10^{-3}	0.19
8.0×10^{-3}	0.19
1.1×10^{-2}	0.20
2.0×10^{-2}	0.15
3.2×10^{-2}	0.12
5.0×10^{-2}	0.08
6.4×10^{-2}	0.09
1.07×10^{-1}	0.08

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p. 46). The extraction coefficient is lowered by a factor of about 3 to 3.5 as the zirconium concentration is raised from tracer level to 0.1 M. The results indicate that, under the above experimental conditions, isotopic dilution is not an effective means of achieving added decontamination in Purex system.

Additional conclusions can be drawn from this data, to wit: 1) At high zirconium concentrations a labile polymeric equilibrium exists. 2) Since the extraction coefficient decreases with increasing zirconium concentration, the polymer number of the organic phase is less than that of the aqueous phase. 3) At low zirconium concentrations the polymer number of the aqueous and organic phases is one. Thus at zirconium concentrations of less than about 10^{-3} the principal species is a monomer, and it is a monomer that is extracted into the organic phase.

Diffusion of Zirconium in Aqueous Uranyl Nitrate - Nitric Acid Solutions

The diffusion coefficient for Zr(IV) in the second and third Purex HA scrub stages was determined to see if there was any indication of polymeric behavior. Table VI is a summary of the data. For purposes of comparison earlier work has been included.

TABLE VI

OBSERVED DIFFUSION COEFFICIENTS FOR
Zr IN 0.15 M UO_2^{++} , 3.0 M HNO_3

<u>Scrub Stage</u>	<u>$D \times 10^6 \text{ cm}^2/\text{sec}$</u>
1	5.4 $\pm$ 0.8
2	6.2 $\pm$ 0.8
3	5.5 $\pm$ 2.5
- A	4.6 $\pm$ 0.5
- B	7.0 $\pm$ 0.6
- C	5.8 $\pm$ 0.6

A Zr activity was spiked into 0.15 M UO_2^{++} , 3.0 M HNO_3 from 0.025 M TTA in benzene.

B This value was determined for Zr(IV) in 1.35 M UO_2^{++} , 2.0 M HNO_3 . It is corrected for the difference in viscosity of the two solutions.

C The Zr activity was spiked into 1.35 M UO_2^{++} , 2.0 M HNO_3 from 0.025 M TTA in benzene. This value is corrected for the difference in viscosity of the two solutions.

The data indicate that at low zirconium concentration the same "species" exists in the Purex scrub section. In view of the isotope dilution work, the most likely predominant species is a monomer.

DECLASSIFIEDURANIUM PROCESSINGFlurex Process

Flurex process studies have been continued to elucidate the role of various process variables, particularly the relationship between current density at the cathode and the efficiency of uranyl reduction.

In a further experiment (Run 14) at a cathode current density of 2 amp/in², vigorous stirring of the tin-amalgam cathode resulted in an increase in current efficiency (for reduction) from the 42 percent reported in HW-43938-H to 94 percent. The feed effluent of Run 14 was 0.04 M acid deficient because of transfer of hydrogen ion to the cathode chamber. If the feed solution were stoichiometrically neutral UNH, a transfer efficiency of about 0.10 for hydrogen ion (and 0.90 for uranyl) would account for the data.

Data from runs in which membrane current densities ranged from 0.11 amp/in² to 0.22 amp/in² disclosed that the feed effluent volume was about 30 percent of the influent volume; whereas the uranium content of the effluent was only four percent of that originally present. Since the uranium content is decreasing at a faster rate than the effluent volume, it is believed that the uranium in the effluent can be reduced to discard concentration, without reducing the effluent to a prohibitively small volume. If so, uranium recovery from the effluent stream would be unnecessary.

Preparation of Uranium Hexafluoride

Continued studies in the preparation of uranium hexafluoride have been concerned with the possibility of reaction between UF₆ and unreacted NaUF₅ in the absence of fluorine, since it is possible that this situation could occur in a moving bed. To simulate this condition, UF₆ was passed over NaUF₅ in a calcium fluoride reaction boat at 350, 450 and 550 C. Weight gains of 62, 69 and 42 percent, respectively, occurred after about 1.5 hours exposure, and in each case the bed of powder converted to a dark-brown brick-like sintered mass which, on exposure to the moist laboratory air, turned green at the surface. Fortunately, the uranium in the brown residue was completely converted to the hexafluoride upon exposure to fluorine at 450 C. Although the formation of such materials may not affect the chemical feasibility, they could possibly adversely affect the mechanical operation of the system.

Some fluorination experiments were performed on NaUF₅ which had been previously melted, cooled, crushed and screened. As expected, the reaction rate was slower than with powder or pellets; however, conversion to the hexafluoride was complete. This low reaction rate may actually be desirable, as too rapid reaction may result in uncontrollable heat evolution capable of melting the reactor's contents and plugging the equipment.

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Chemical Preparation NaUF₅

Work on the chemical preparation of NaUF₅ has been continued with a series of experiments to determine the effect of additives upon the decontamination obtained during the reprecipitation step. A mole of uranium was precipitated from Purex 2DF solution in the usual way. The precipitate was then divided into four portions, each of which was metathesized and dissolved. Phosphoric acid, EDTA (ethylenediaminetetracetic acid) and HEDTA (hydroxyethylethylenediaminetriacetic acid) were added to three of the solutions before reprecipitation of the double fluoride. (These additives were not introduced in the precipitation step because of the presence of iron which would complex the "versenes" and precipitate the phosphate. As it was, some premature precipitation occurred in the reprecipitation step when the phosphate was added.) Decontamination data are reported in Table VII.

TABLE VII

NaUF₅ PRECIPITATION - DECONTAMINATION DATA

<u>Sample Description</u>	<u>Additive</u>	<u>Gross β c/m/mg U</u>	<u>Gross γ (a) c/m/mg U</u>	<u>β D.F.</u>	<u>γ D.F.</u>
Purex 2 DF	-	38.1	37.2		
Initial NaUF ₅	-	32.5	15.2	1.2	2.5
Reprecipitated NaUF ₅	-	28.5	7.6	1.3	5.0
Reprecipitated NaUF ₅	H ₃ PO ₄	28.8	8.3	1.3	4.5
Reprecipitated NaUF ₅	EDTA	26.2	2.5	1.5	15
Reprecipitated NaUF ₅	HEDTA	28.5	6.3	1.3	6
NaUF ₅ from aged natural U		80.4	2.3 (Counted immediately)		
NaUF ₅ from aged natural U		76.3	2.5 (Counted after 60 days)		

(a) Only gamma emitter detected was Zr-Nb.

With the exception of EDTA the additive had little or no effect on the gamma decontamination factor which was about five; EDTA, however, increased the gamma decontamination factor to 15, and the activity of the resulting product (Zr-Nb) was equal to that of aged natural uranium.

The beta activity initially was only 50 percent of that of aged natural uranium. The greatest beta decontamination factor obtained was only 1.5 and occurred in the experiment in which EDTA was used. It was also demonstrated that no decontamination from uranium daughters occurs in the precipitation process.

Because of present interest in the economics of the iron-fluoride reduction process, a careful reevaluation was made of the amount of fluoride necessary to ensure complete uranium recovery. These experiments, based on precipitation of a mole of uranium, reaffirmed the conclusion that attainment of less than 0.1 percent uranium loss in the precipitation step requires sufficient fluoride to complex all the ferric iron produced (about 12 moles of fluoride per mole of uranium).

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Exploratory Experiments

Scouting experiments were performed to determine whether UO_3 could be reduced to a uranium(IV) compound by heating with an ammonium salt. Mixtures of UO_3 with the following compounds and mixtures of compounds were prepared: $(NH_4)_2SO_4$, NH_4F , $(NH_4)_2SO_4-NH_4F$, NH_4F-NaF , and $(NH_4)_2SO_4-NaF$. These mixtures were then heated in platinum boats by placing in a furnace at 300 or 450 C. Although ammonia was lost during the reaction, reduction occurred in every case as attested by the formation of a green product. The product of the reaction of UO_3 and $(NH_4)_2SO_4$ was completely water soluble; in the other cases (where fluoride was present) an insoluble residue (probably uranium tetrafluoride or a double fluoride) was formed.

ISOTOPE SEPARATION

Thermal Diffusion

Results from the final TBP-uranyl nitrate thermal diffusion demonstration run continue to come in. One sample taken after five (5) days during which the column was intentionally vibrated showed a decrease in uranium-235 from 0.7187 percent to 0.7176 percent. This tends to confirm the suspicion that low results observed in the refrigerated runs were due to pump vibrations.

Chemical Exchange

Further investigation of exchange characteristics in the system $UCl_4-HCl-H_2O-TTA-C_6H_6$ have been made. The uranium(IV) - uranium(TTA) $_4$ contacting experiment at 1 M HCL mentioned in HW-43938-H was completed, but no isotopic analyses have been obtained.

The rate of exchange of uranium between TTA and two molar hydrochloric acid was determined to clarify the kinetics of the system. The results of this and other experiments at various hydrochloric acid concentrations are presented in Table VIII.

The fact that K decreases with decreasing acidity is probably due to hydrolysis of the UCl_4 , a reaction which competes with the TTA complexing. At the higher concentration of two molar hydrochloric acid, chloride complexing may also effect the value of K. No simple rate law was found applicable to all the rate data in Table VIII.

Fused Salt Electromigration

Continued efforts have been made to define a fused salt system capable of continuous operation. Two runs were made in an apparatus consisting of a quartz tube (two inches in diameter) containing lead chloride into which were partially immersed a separation tube and an alundum thimble containing LiCl-KCl eutectic

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TABLE VIII

EFFECT OF HYDROGEN ION ON EQUILIBRIUM CONSTANT
AND RATE OF EXCHANGE IN THE SYSTEM TTA-UCL₄ - HCl-H₂O

<u>HCl</u> <u>M</u>	<u>U^{IV}</u> <u>M</u>	<u>U(TTA)₄</u> <u>M</u>	<u>Free TTA</u> <u>M</u>	<u>E_a^o</u>	<u>K^(a)</u>	<u>Rate</u> <u>mol/l/min</u>
2.0	0.0042	0.0095	0.24	2.3	1.05 x 10 ⁴	25.9 x 10 ⁻⁴
0.60	0.0062	0.0071	0.0072	1.15	0.56 x 10 ⁴	12.4 x 10 ⁻⁴
0.050	0.0062	0.0066	0.0085	1.07	0.13 x 10 ⁴	9.6 x 10 ⁻⁴
0.042	0.0102	0.0032	0.0048	0.32	0.18 x 10 ⁴	8.0 x 10 ⁻⁴

(a) $K = \frac{E_a^o(H^+/TTA)_4}{U(IV) / 4TTA} \rightleftharpoons U(TTA)_4 / 4H^+$ and derived from $U(IV) / 4TTA \rightleftharpoons U(TTA)_4 / 4H^+$

and a graphite cathode. The duration of the runs were 21 and 38.5 hours, respectively, and each was terminated because of void formation in the packed separation tube. Run data will be reported when isotopic analysis are available.

Test specimens of several types of carbon impregnated graphite were immersed in molten LiCl-KCl eutectic to determine their permeability. One type, "Graph-i-tite A", showed a weight gain of only about 0.5 percent at 600 C and should be a satisfactory container.

UO₃ Studies

Studies were continued to establish relationships between physical and chemical properties, process variables, and reaction characteristics of uranium oxides. Reduction rate measurements were made on a few typical UO₃ samples prepared by batch and continuous calcination of uranyl nitrate and on some laboratory preparations. When heated in hydrogen, the batch type oxide started to react at 425 C, and at 495 C, ten minutes later, reaction was complete. A temperature of 500 C was tentatively chosen for the reduction studies, as the reaction rate is conveniently measurable at this temperature. Items 1 and 2 in Table IX show that accurate temperature control is necessary as the rate is highly sensitive to temperature.

The data of Table IX are somewhat limited; however, it is interesting to note that samples 5 and 6 which show high reactivity ratios are slow to reduce.

An attempt was made to correlate certain properties of UO₃ produced in the pilot plant continuous calciner.

No correlation was found between feed point temperature, discharge temperature, or "reactivity ratios" and bulk and packed densities of either UO₃ spheres, as produced, or the milled powder.

No close correlation appears to exist between feed point temperature and "reactivity ratios". However, in samples containing from 0.05 to 0.33 percent sulfate additive, "reactivity ratios" ranged from 0.75 to 0.95 for feed point temperatures

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TABLE IX

REDUCTION TIMES FOR VARIOUS UO_3 SAMPLES

Sample Source	Feed pt. and Discharge Temp. C	Sulfate %	Reactivity Ratio 590/410 C	Gas Temp. C	Time for Reduc.		
					80% Min.	97% Min.	100% Min.
1. Hanford Pot				553	3	3.7	20
Hanford Pot				500	5	13	23
Hanford Pot				445	11	18	100
2. Pilot Plant	295/310	0.38	1.30	560	4.3	5.5	31
Continuous				500	13.5	17	25
3. Hanford Pot			1.1	500	5	13	23
4. Mallinckrodt			1.00	500			
Pot							
5. Pilot Plant	295/310	0.38	1.30	500	13.5	17	25
Continuous							
6. " "	260/280	0.38	1.24	500	12	15	24
7. " "	295/310	0.13	1.00	500	6.7	10.7	21
8. " "	230/250	0.14	0.84	500	4	6	12.5
9. Heated UNH - released at high pressure				500	3	5.5	12.5

of 280 C or less and from 1.00 to 1.14 for feed point temperature of 290 C or higher.

The "reactivity ratio" varied with the sulfate content in samples from one run in which sulfate was increased from 0.04 percent to 0.23 percent and then gradually decreased to 0.01 percent. Also, in samples containing sulfate in excess of 0.33 percent, high "reactivity ratios" (1.2) were observed. In all other cases no clear-cut correlation was evident.

The "reactivity ratios" quoted above were obtained by performing the reduction at 590 C and fluorination at 410 C. It is now known that reduction at 925 C and fluorination at 600 C, give reactivity ratios more significant with respect to K-25 processing. It is, of course, unknown whether high temperature "reactivity ratios" would form useful correlations with the variables in question.

As a further aid in the characterization of oxides, average partical size has been determined on a number of samples. Surface area is then calculated and compared to BET measurements in order to estimate porosity. In general, all pot powders have been found to be quite similar; the porosity (defined as $\frac{\text{Surface area by BET}}{\text{Surface area from average diameter}}$) ranging from 6.4 to 8.8. Two samples of

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continuously produced UO_3 (at 295 C) had porosities of 20 and 24; two samples produced at 230 C had porosities of 8.6 and 15.6. Too few data are available for interpretation, but this approach may be valuable in characterization of oxide types.

The general observation reported last month from electron microscopy data for UO_3 and UO_2 powders can be modified as a result of studying additional data.

1. The variation of particle size of Hanford "continuous" powders is primarily a function of feed point temperature and sulfate addition. Low feed temperatures yield larger crystals (up to 1 or 2 micron) while high feed temperatures produce very fine particles of non-crystalline appearance. Sulfate addition reduces particle size and eliminates some of the crystalline appearance in both cases.
2. Dioxides produced by preheating UO_3 to a high temperature (870 C) in an inert gas followed by reduction with hydrogen either at that temperature or after cooling to 535 C have crystals showing a marked sintering effect; the edges of large crystals being rounded off and the smaller crystals having coalesced. UO_2 prepared at the lower temperature and subsequently heated to 870 C shows no indication of sintering; therefore, sintering must have occurred during the U_3O_8 stage.

A two stage fluidized bed demonstration unit has been fabricated and is now being installed. A glass prototype was used to fix the final design and determine the operating characteristics of the system. The unit includes a screw conveyor feed system and is constructed of inconel and monel, capable of withstanding hydrogen fluoride or fluorine.

A brass model of an ejection nozzle for a high pressure feed system has been designed and built. It will serve, with modification, as the model for a test nozzle of stainless steel.

Plutonium Anion Exchange Process

Since earlier experiments showed a satisfactorily high distribution of plutonium between Dowex-1 and aqueous solutions of various metal nitrates (total nitrate, 7-8 molar) the work was extended to a study of kinetic behavior in the same systems.

The relative rates of uptake of plutonium(IV) by Dowex-1 from various aqueous solutions, each eight molar in nitrate and one molar in acidity, were in the following order:

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Uptake from nitric acid appears fast enough for a practical plutonium separation process, but it is doubtful if the others would be satisfactory.

Various reducing agents for elution of plutonium at high concentrations from Dowex-1 were looked at. Ascorbic acid reduced the plutonium rapidly and without gassing. On standing several days, a precipitate formed which is thought to be plutonium oxalate; the oxalate resulting from the degradation of ascorbic acid. Ferrous iron is satisfactory kinetically but adds an unwanted ion to the product solution. Hydroxylamine was slow and tended to gas. Gallic acid was also not acceptable.

At present Purex IWW which contains plutonium in excess of discard limits is reworked by re-introducing it into the main line process at the dissolver. Since the acid concentration of the IWW makes it appropriate for processing by anion exchange resin, the possibility of reworking by this method was suggested. As laboratory experiments with the quantities of IWW necessary for conclusive testing are essentially impossible, it was decided to set up a test experiment in the IWW sampling cubicle in the Purex plant.

In support of this joint program (with Chemical Development personnel), a literature survey has been made on the radiation stability to be expected of Dowex-1. This has disclosed a probable useful life of 200 hours for a column three inches in diameter saturated with IWW solution. Laboratory work has also been done to correlate hydrodynamic variables and the following pressure drop expressions have been developed:

$$P = 0.053 \text{ FD for 20-50 mesh Dowex-1, and}$$

$$P = 0.45 \text{ FD for 50-100 mesh Dowex-1,}$$

where P is the pressure head in g/cm^2 , F is the flow rate in ml/min/cm^2 , and D is the bed depth in cm.

ANALYTICAL DEVELOPMENT

Coulometry and Plutonium Assay

Using a newly designed cell which provides for better mixing of solutions than formerly was possible, several test titrations were made using standard solutions of ceric sulphate, potassium dichromate and combinations of these two. Precision of ± 0.3 percent or better was obtained in all runs, using derivative polarographic endpoint detection. An initial investigation was made into the use of fluoride complexing of ceric ion to inactivate it in solution. Titration curves show a discontinuity at the dichromate equivalence point in titrating a dichromate-ceric mixture in 0.6 M fluoride solution, but the "break" at that point was not sharp enough for accurate determinations. Further study of this method is in progress, as well as of other means for removing or inactivating the ceric oxidizing agent.

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Zirconium Analysis

A series of 12 samples consisting of zirconium and Zircaloy 2 and 3 were received from the Metallurgy Sub-Section for typing. All of the samples were identified by using a direct sparking technique based on a Bureau of Mines procedure. The results and the method used were verified by qualitative analysis by the Analytical Laboratories Unit by Quantometer results later received from the Bureau of Mines.

Aluminum-Silicon Alloy

A spectrographic (photographic) procedure for analysis of AlSi has proven feasible although it would not have the necessary accuracy. Using the same excitation conditions, calibration work with the direct reader has been started. Direct reader receivers have been set on aluminum 2669, silicon 2987.6 and mercury 5675.9 lines for use in the determination of silicon in AlSi. The receiver set on the mercury line is used to monitor the receiver positions and realign the other two receivers if the camera has shifted or has been taken off the spectrograph. This adjustment is simple and takes only a few minutes.

Alpha Standardization

Because of the previously reported discrepancy between measurements by Hanford and the University of California Radiation Laboratory personnel on two Americium-241 standards prepared by the Radiation Laboratory, the dimensions of the 325 Building ASVP chamber (low geometry, alpha standard counter) were remeasured by the Optical Shop. They were found to have changed significantly, probably as a result of repeated decontamination. A re-evaluation of the standards on the 325 Building ASVP using the newly measured dimensions for calculations of the geometry factor gave the following results:

	<u>d/m HAPO</u>	<u>d/m UCRL</u>	<u>% Difference</u>
No. 10	$4.705 \pm 0.005 \times 10^6$	$4.713 \pm 0.005 \times 10^6$	-0.17
No. 12	$3.730 \pm 0.004 \times 10^7$	$3.728 \pm 0.001 \times 10^7$	+0.05

The precision reported on the HAPO-determined values is based on counting statistics at the 95 percent confidence limit. The precision reported by UCRL is "the actual weighted r.m.s. deviation of the several measurements from the weighted mean." The agreement is as good as can be expected because of uncertainties in coincidence loss and chamber and source dimensions.

A recent evaluation of Am-241 source on the 325 Building ASVP and the 234-5 Building ASVP's gave the following comparison of the instruments:

	<u>d/m observed</u>
325 ASVP	183, 700 $\pm$ 200
234-5 ASVP No. 1	183, 400 $\pm$ 400
234-5 ASVP No. 2	182, 600 $\pm$ 300
234-5 ASVP No. 3	182, 900 $\pm$ 400

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A 0.6 percent range is noted among these values. This is probably not significant for most applications. The quality of the source used in this comparison was not ideal and may account in part for the deviations.

Gamma Scintillation Counter Calibration

The disintegration rate determined by R. E. Buchanan of ANL for the cesium "K-factor standard" was used to measure the ratio of c/m to d/m for Cs-137 as observed with the HAP0 gamma scintillation counter. A value of 0.041 was obtained. This is nine percent higher than the value of 0.0374 currently being used. These values are useful in estimating the accuracy of our conversion from counts per minute to disintegration rate.

Plutonium Standard

A 250 ml standard plutonium chloride solution for methods evaluation and calibrations in both research and separations process control activities has been prepared. The solution was made up from a ten-gram sample of pure plutonium metal to a known concentration, and the assigned value was then confirmed by igniting several aliquots to a residue of PuO_2 at 1050 to 1100 C.

The metal sample proved to be difficult to dissolve in hydrochloric acid, and excess acid addition, bromine addition, and nitric acid addition were all tried. Ultimately a small residue of insoluble material remained. This was ignited at about 1050 C, weighed, and applied as a "make-up" correction (0.3%) assuming the residue to be plutonium.

Because a large excess of reagents and water were used in the dissolution, considerable impurities (about 2800 ppm) were introduced. These were determined spectrographically and corrections applied (0.4 percent) to the PuO_2 residue weights from the "gravimetric" standardization. The analytical results obtained on the standard solution are given in Table X. The agreement between make-up and standardization values is surprisingly good, considering the number of corrections required.

TABLE X

CONCENTRATION OF STANDARD Pu SOLUTION

1. By make-up	40.88 g/l Pu
2. By ignition of measured aliquots to PuO_2	(a) 40.92
	(b) 40.93
	(c) 40.95
	Average = 40.93
	Difference between 1 and 2 = 0.12 percent

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Ignitions above 1100 C were not tried, but for the present the residue at 1050 to 1100 C is assumed to be PuO_2 , stoichiometrically. Previous observations that residue weights of plutonium dioxide do not reach a minimum value below 1050 C were confirmed.

IN-LINE ANALYSIS

Photometry

Standardization of in-line uranium photometers has been a troublesome chore because of the poor stability of some standards and the large amount of standard solutions used. In order to obtain internal standardization, a "dual beam" photometer is under development. The particular method now being studied is that of providing a movable filter which can be placed in the light path of the photometer sensing unit at will. An air piston mechanism moves the uranium photometer filter (e.g., Corning No. 5113) out of the beam and replaces it with a Corning No. 3484 filter which makes the photometer insensitive to uranium. In the absence of interfering colored constituents, the reading on the second filter, can be used for reference or standardization. The standardization step can be automatic and laboratory performance tests are underway.

A photometer sensing unit with a precisely reproducible sample cell is being developed. A fabrication method based on the use of a metallic inner mold (possibly an aluminum bronze) to form the inner cell shape and size has been proposed by the glass shop technicians. A cell with a fixed path along with a few other refinements in the photometer may help meet the need for interchangeable sensing units and a photometer whose output is recorded directly into concentration units.

Liquid Contact Alpha Monitor

A prototype in-line unit for plant tests has been completed. Several scintillation screens and spiral-groove cells are available for the initial hot, wet tests. The test cells were prepared with several groove depths and percent grooved areas. The cells are made by a hot stylus method with a hollow cutting tool using polythene discs.

URANIUM POLAROGRAPHY

The study of the application of a small AC potential to a normal polarographic circuit and the analysis of the AC current resulting was continued. It was established that uranium could be determined at concentrations of uranium above 0.01 g/l even in the presence of 0.03 M iron. Determination of lower quantities of uranium are prevented by the relatively large residual AC current due to the charging process. As in the application of normal polarographic techniques to the determination of uranium (HW-42637), TBP and its degradation products cause difficulties in making accurate determinations of the amount of uranium present.

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In order to study the determination of uranium in lower concentration a square wave technique was considered in which a symmetrical square wave is superimposed on the normal polarographic AC potential, and the resultant AC current component is passed through a gating circuit to measure the current due to the electrode process as separate from the current due to the changing process on each current reversal. It is this charging current which prevents greater sensitivity in the AC method. A gating circuit was designed and built for use in square wave polarography. The purpose of the circuit is to permit analysis of the trailing edge of the square wave only.

MISCELLANEOUS INSTRUMENTATION

The gas scintillation fission counter has been completely assembled and tested. Specifications were prepared for the procurement and assembly of a special high sensitivity, automatic printing gamma analyzer assembly. A linear coupling device to permit direct chart recording from the National Spectrographic Company plate densitometer was completed and tested. Linearity and accuracy are about 0.5 percent. Liquid level gauges of a capacitance type have been designed for a research "profile" pulsed column and a pneumatic shutter mechanism for change of filters in in-line photometer sensing units was completed.

LABORATORY SERVICES

Laboratory Services activities may be summarized as follows: 80,000 gallons of crib-level waste was transported to 200 West Area for disposal. Average plutonium analysis was 1.0×10^{-4} uc/ml. Average gross beta analysis was 3.5×10^{-2} uc/ml.

Approximately 3,000,000 gallons of retention-level waste was discharged to the 300 Area pond. Average alpha analysis was less than 4.5×10^{-7} uc/ml. Average beta analysis was less than 8.0×10^{-7} uc/ml.

All other decontamination, building services, and laundry functions were completed in a routine manner.

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TECHNICAL SHOPS UNIT

Mechanical Shops

The work continued at a high level but the overtime was reduced to 559 hours for the month.

Further investigations were made into shop procedures for handling zirconium. Consultations were held both with local scientists and with representatives of the Bureau of Mines.

Buildings and Grounds

W. O. A-15613 (Construction of Cylinder Loading and Storage Deck) was completed and the deck accepted this month.

By month's end, IR-200 (Graphite Machining Facility) was essentially complete.

ER-3133 (Alterations of 325 and 326 Buildings) is being studied by the AEC.

Drafting and Design

The work load increased continuously through the month until at month's end there was a combined backlog of drafting and graphics work of 1400 hours. This represented a backlog growth of over 600%.

Glass Shop

Total productive man hours for the month was 887 with 101 jobs finished. All requests were met on time even though a backlog of 140 hours existed at month's end.

Photo Laboratory

Although the heavy work load continued, the backlog was reduced to three week's work. During this month the laboratory completed its largest single order, the illustrations for HW-40,000, the Fuel Element Technical Manual. This one order involved over 7000 prints.

CONTACT ENGINEERING UNIT

The construction of the prototype calciner was completed and shakedown runs are in progress. Some malfunctioning was observed in the shaft seal on the drive end, and tests are in progress to determine if the fault is basic or one of adjustment. A design change was recommended for the plant units to minimize the fault. An experimental determination of power requirements agreed well with calculated values. One eighteen-hour calcining run was completed; while the results were not definitive, they were encouraging.

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ANALYTICAL LABORATORIES UNIT

General Chemical Laboratory

Support of Chemical Development studies represented 80 per cent of the work load.

Total uranium was determined in lead castings. Uranium fluorimetry applied after lead removal as the sulfate.

Potassium was determined in blood serum by flame photometry.

Viscosities at -15°F to 122°F were determined for HW Material #116 (commercial sulfuric acid). That temperature range was felt to include typical outside temperatures. Bath material at the lowest temperature was an alcohol-ice mixture judiciously cooled with liquid nitrogen.

Nine Savannah River aluminum matrix slugs (LMF) were received for total uranium and isotope ratio determinations. Eight of the slugs contain five per cent (5%) U-235 and one slug, four per cent (4%). Corresponding observed densities were 2.826 - 2.819 g/cc for the five per cent slugs and 2.799 g/cc for the four per cent. Slugs were reduced to 1/8 inch wafers and resultant turnings. Total dissolution is proceeding. Wafers of at least one slug exhibited the unexpected property of dissolving from the middle toward the circumference.

Radiochemical Laboratory

Support was concluded both for Co-60 monitoring in 200 Area pooled waste and for specific fission product measurement in plant RAF, RCU, and REU.

A week's backlog exists for gas analysis. Standard procedures are being written preparatory to transfer of a significant portion of that work to non-exempt status.

Significant effort was spent on preparations for support of Washington designated programs.

Spectrometry Laboratory

Mass: For several weeks the sensitivity of the uranium mass spectrometer has been inadequate for supporting isotope enrichment studies. Current repairs have restored the sensitivity required by those studies. A new filament assembly was installed, vacuum leaks were repaired, and faulty tubes and condensers were replaced. Analysis of Manufacturing UO_3 samples continued.

All spectrometers were in operation within two working days after a 325 Building water outage.

The General Electric Company analytical mass spectrometer is scheduled for transfer August 15, 1956, to Chemical Research.

The IR (ion resonance) mass spectrometer is undergoing trouble shooting and should be in service next month.

Emission: Cesium assays are being made for Chemical Engineering Development. Sensitivity remains at 0.01 g Cs/l and precision at 10 per cent, 95 per cent C.L.

Water Quality: KAPL-120 support was reduced due to 100-H pile down time. Training of new personnel is proceeding during the interim.

Laboratories work volume statistics are as follow:

	JUNE		JULY	
	<u>No. of</u> <u>Samples</u>	<u>No. of</u> <u>Determinations</u>	<u>No. of</u> <u>Samples</u>	<u>No. of</u> <u>Determinations</u>
<u>Research and Development</u>				
File Technology				
Fuel Technology	26	167	44	201
Metallurgy Research	44	261	5	91
Physics Research	29	65	7	235
Pile Engineering	22	110	4	20
Pile Materials	514	1489	559	1549
Separations Technology				
Chemical Development	443	805	629	1189
Chemical Research	993	1753	711	1101
Plant Processes	16	22	5	71
<u>Process Technology</u>	676	1640	524	960
<u>Other Customers</u>	142	600	106	457
Total	2905	6912	2594	5874

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INVENTIONS

All Separations Technology Section personnel engaged in work that might reasonably be expected to result in inventions or discoveries advise that, to the best of their knowledge and belief, no inventions or discoveries were made in the course of their work during July, 1956 except as listed below. Such persons further advise that, for the period therein covered by this report, notebook records, if any, kept in the course of their work have been examined for possible inventions or discoveries.

Inventor(s)

Title

J. E. Meinhard

Continuous Ion Exchange Unit

R. B. Richards

Manager, Separations Technology
ENGINEERING DEPARTMENT

DESIGN SECTION

August 10, 1956

VISITORS AND BUSINESS TRIPS

J. Dietz and C. McVey of the Thomas A. Edison Company, West Orange, New Jersey visited Hanford On July 5 to deliver a revised prototype of a temperature monitor.

W. J. Kaufman of the University of California, Berkeley, California, and W. L. Shannon of Shannon and Wilson, Seattle, Washington visited Hanford On July 7 through 11 to provide consultant services on radioactive waste disposal problems.

D. R. Combs of the Bumstead-Woolford Company, Seattle, Washington visited Hanford on July 11 and 12 to inspect Foxboro equipment installed in the 189-D Building.

S. Brown of the U. S. Geological Survey, Portland, Oregon visited Hanford on July 12 to obtain hydrographic information concerning the Columbia River.

W. W. Warren of the Ladish Company, Seattle, Washington, R. O'Brien of the Ladish Company, Cudahy, Wisconsin, R. Burke of Tube Turns, Inc., Seattle, Washington, and F. S. Briggs of Tube Turns, Inc., Louisville, Kentucky visited Hanford on July 13 for discussions concerning the availability of titanium fittings.

C. S. Slenning of the Minneapolis-Honeywell Regulator Company, Richland, Washington visited Hanford on July 16 to inspect segmental recorders which had been damaged in shipment.

H. Gartmann of the DeLaval Steam Turbine Company, Trenton, New Jersey visited Hanford on July 16 through 21 to witness cavitation testing of process water pumping units.

W. J. Dowis attended "Planning for Profit" conferences at Association Island, New York on July 5 through 7.

R. C. Hollingshead visited Symington-Gould Corporation, Depew, New York, International Testing Laboratories, Newark, New Jersey, and United States Testing Company, Hoboken, New Jersey for discussions concerning a proposed stud testing program; and Ingersoll-Rand Company, New York City, New York for discussion of controlled torque impact wrenches, on July 9 through 12.

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L. G. Henke visited the Continental Equipment Company, Coraopolis, Pennsylvania, and S. P. Kinney Engineers, Inc., Carnegie, Pennsylvania on July 10 and 11 to obtain design information regarding new reactor components.

C. W. Harrison visited Washington Iron Works, Seattle, Washington, Western Gear Works, Seattle, Washington, Todd Shipyards, Seattle, Washington, Steward Machine Works, Seattle, Washington, Pacific Car and Foundry, Renton, Washington, Atlas Foundry, Tacoma, Washington, Pacific Oerlikon Company, Tacoma, Washington, Electric Steel Foundry, Portland, Oregon, Willamette Iron and Steel Company, Portland, Oregon and West Side Tool and Die Company, Portland, Oregon on July 10 through 13 for consultations concerning castings for a monochromatic neutron spectrometer.

C. E. Kent visited Seattle, Washington on July 14 to attend a meeting of the Arrangements Committee for the 1957 AIChE National Meeting.

W. D. Bainard visited Chicago Water Works, Chicago, Illinois, Knolls Atomic Power Laboratory, Schenectady, New York, Dorr-Oliver, Stamford, Connecticut, and Oak Ridge National Laboratory, Oak Ridge, Tennessee on July 16 through 20 to secure information on hydroclone applications and corrosion problems in the 100 Areas.

C. O. Clemetson attended the Gordon Research Conferences of the American Association for the Advancement of Science at Colby Junior College, New London, New Hampshire on July 22 through 28.

J. C. Whipple visited Consolidated Edison Company, New York City, New York, Sheppard T. Powell, Inc., Baltimore, Maryland, Alexandria Water Company, Alexandria, Virginia, and E. I. duPont de Nemours Company, Savannah River, South Carolina on July 23 through 28 to obtain information on water treatment facilities and recirculation coolant systems for reactor plants.

O. W. Priebe visited W. C. Nickum and Sons, Seattle, Washington on July 25 to provide technical assistance and review Architect-Engineer drawings for silica gel tail end treatment facilities for the Purex Plant.

R. H. Beaton visited Argonne National Laboratory, Chicago, Illinois on July 25 for discussions concerning new reactor design technology, and attended "Planning for Profit" conferences at Association Island, New York on July 26 through 28.

M. H. Schack visited Bingham Pump Company, Portland, Oregon on July 26 to obtain design information on reactor process water pumps; and the Corps of Engineers, Portland, Oregon on July 27 for discussions concerning the construction of a scale model in connection with studies of the Columbia River.

C. E. Huck visited Model and Instrument Works, Seattle, Washington on July 30 to review fabrication progress of beta monitors for the 100-K reactors.

ORGANIZATION AND PERSONNEL

Personnel Statistics:

	June 30			July 31		
	Exempt	Non-Exempt	Total	Exempt	Non-Exempt	Total
Design Management	2	1	3	2	1	3
Process Engineering Sub-Section	78	15	93	79	15	94
Design Planning Unit	20	13	33	20	14	34
Design Engineering Sub-Section	81	12	93	81	11	92
Design Drafting Unit	7	69	76	7	73	80
Total Section Personnel	188	110	298	189	114	303
Rotational Technical Graduates	--	5	5	--	6	6
Total	188	115	303	189	120	309

Accessions - 12

Separations - 6

GENERAL

Total engineering and drafting man months expended on Design Section managed projects and customer work increased substantially during July while effort on design development programs and process technology showed a corresponding decrease. Distribution of effort by major components for the month of July was as follows:

	Engineering Man Months Expended	Drafting Man Months Expended	% of Section Effort
Design Development Programs	69.5	8.7	31.8
Design Section Managed Projects	73.1	41.3	47.9
Advance Engineering - FY 1957 & FY 1958	4.5	0.5	2.0
Process Technology	0.6	--	0.3
Customer Work	19.0	23.3	18.0
Total	166.7*	73.8	100.0

*Equivalent man months expended includes 10 hours of engineering overtime which represents 0.02% of the Section based on the total available hours for a normal 40 hour week.

The Design Drafting Unit production for July was 212 new drawings and 273 drawing revisions for an equivalent of 4.6 man days per drawing.

DESIGN DEVELOPMENT

The distribution of engineering and drafting man months applied to design development programs during July was as follows:

	<u>Engineering</u>		<u>Drafting</u>	
	<u>Man Months</u>	<u>% of Total</u>	<u>Man Months</u>	<u>% of Total</u>
Metallurgical Design Development	6.6	9.5	0.5	5.8
Reactor Design Development	29.7	42.7	1.5	17.2
Separations Design Development	25.5	36.7	3.7	42.5
Chemical Processing and Reduction Design Development	4.1	5.9	0.7	8.1
234-5 Design Development	<u>3.6</u>	<u>5.2</u>	<u>2.3</u>	<u>26.4</u>
Total	69.5	100.0	8.7	100.0

Metallurgical Design Development

Studies were completed during July of the cost of fabricating various types of fuel elements which are being evaluated in connection with engineering feasibility studies of a gas-cooled production reactor. The alternates considered included a 0.186 inch diameter uranium core with a coextruded 3 mil zirconium jacket, a coextruded 5 mil zirconium jacket, and an electroplated 3 mil iron jacket. Costs of the fuel elements studied ranged from \$1.65 to \$7.67 per pound of uranium.

Other metallurgical design development activity during the month included preparation of specifications and preliminary drawings for automatic welding and cut-off equipment, investigation of methods of mechanizing present 313 Building operations such as shipping box unloading and pickle basket loading, and studies of the application of induction preheating units to slug, can and cap assembling equipment.

Reactor Design Development

Document HW-44328 was issued during the month presenting a preliminary discussion of the results of studies of improved production reactor technology. Conclusions presented in this document include: (1) the graphite moderated, liquid cooled reactor concept best meets the functional and schedule objectives of the improved production reactor program, (2) development emphasis should be on the attainment of coolant temperature conditions suitable for efficient power recovery, and (3) the range of potentially attainable economic performance includes replacement of two or more of the existing reactors having highest operating costs with improved units having a pay-off period not greater than 10 years from the date of authorization of detailed design. Document HW-44296, "The Economics of Replacement Reactors," was also issued during July in connection with this program.

A study was initiated during the month to determine the modifications to the 100-K Area facilities which would be necessary to sustain a process water flow rate of 175,000 gpm. A report summarizing the results of this study was in preparation at the end of July.

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Work continued during the month on a study of the recovery of power from an existing reactor which has been pressurized. Study drawings of the power plant layout and equipment arrangements have been completed, as well as narrative descriptions of the equipment. It is expected that a study report will be issued during August.

Other reactor design development items which were active during July include studies of improvements to vertical safety rod system components in existing reactors, studies of the use of organic reactor coolants, and evaluation of prototype temperature monitoring and flow monitoring system components.

Separations Design Development

Work continued during July on studies (being conducted in cooperation with Separations Technology Section) of the process, engineering and economic feasibility of recovering and packaging fission products (cesium - 137, cerium - 144 and strontium - 90) from separations plant process wastes.

Document HW-43795, "A Redox Process Two Cycle Plant Study," was issued during the month summarizing the results of studies of a new separations plant which would utilize a simplified Redox-type flowsheet.

A review of data on the recovery of the aluminum nitrate salting agent in the Redox process was initiated during the month, together with studies of the feasibility and economics of the use of an alternate salting agent such as calcium nitrate.

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

Other separations design development activity during the month included studies of the application of in-line instrumentation in separations plants, investigation of the high pressure drop being experienced across the Purex dissolver columns during operation, and studies of ion-exchange applications in the separations processes.

Chemical Processing and Reduction Design Development

Scope work was completed during July for the installation of continuous Task I-Task II equipment in the 234-5 Building, and a scope document, HW-44105, was issued to provide a basis for detailed design of Project CG-691, Improved Task I and Task II Facilities - 234-5, which was authorized by HOO-AEC during the month.

234-5 Design Development

Studies were continued during the month of equipment which could be utilized in the fabrication of new products at Hanford. Other 234-5 design development activity during July included development testing of prototype equipment for finishing and sizing coated pieces in the final inspection and mating facility.

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Engineering Standards and Materials Development

The following standards were completed during July:

New Standards

- HWS-8001-S - Standard Specification for Metal-Enclosed Switchgear, 600 Volts
- HWS-8005-S - Standard Specification for Metal-Enclosed Switchgear, 4.16 and 13.8 KV
- HWS-8066-S - Standard Specification for Factory-Made Wrought Austenitic Stainless Steel Fittings and Flanges
- D-6-21 a & b - Luminaire and Mast Arm Assembly, Internal and External Wiring
- D-6-70 - Insulating Transformer and Street Lighting Wire on Pole, Lighting Service to Underground
- D-6-71 - Street Light Luminaire on Pole, Served from Underground
- D-10-161 - Primary Fused Disconnect Switch, 100 Amp, 5000 Volt or Less
- D-10-162 - Primary Fused Disconnect Switch, 200 Amp, 5000 Volt or Less

Revised Standards

- D-2-2d - 10'-0" Crossarm, Rev. 1
- S-1-2 - HAPO - Approved Codes, Rev. 4

PROJECTS, PROCESS TECHNOLOGY AND CUSTOMER WORK

Statistics:

Engineering and drafting effort of the Design Section on projects, process technology and customer work for July was distributed as follows:

	<u>Engineering</u>		<u>Drafting</u>	
	<u>Man Months</u>	<u>% of Total</u>	<u>Man Months</u>	<u>% of Total</u>
Reactor Plant Modifications for Increased Production	11.6	11.9	1.8	2.8
Advance Design - Reactor Plant	17.9	18.4	3.6	5.5
100-K Reactor Plants	2.5	2.6	0.8	1.2
Steam Driven Auxiliaries - 165-KE & KW	3.4	3.5	2.2	3.4
Monochromatic Neutron Beam Facility 105-KE	1.1	1.1	3.6	5.5
Continuous Charge-Discharge Equipment C Reactor	5.6	5.8	7.7	11.8
350° C Flow Loop - 314 Building	2.5	2.6	2.9	4.4
Fuel Element Pilot Plant - Semi Works	5.6	5.8	5.2	8.0
Purex Capacity Increase	5.0	5.1	6.3	9.7
Redox Capacity Increase	1.8	1.9	2.0	3.1
Other Design Section Managed Projects	16.1	16.6	5.2	8.0
Advance Engineering - FY 1957 & FY 1958	4.5	4.6	0.5	0.8
Process Technology	0.6	0.6	--	--
Customer Work	<u>19.0</u>	<u>19.5</u>	<u>23.3</u>	<u>35.8</u>
Total	97.2	100.0	65.1	100.0

Advance Engineering - FY 1957 and FY 1958

Work was in progress at the end of July on a report summarizing advance engineering studies for a new Purex tank farm of approximately 10 million gallons capacity.

Advance engineering studies were initiated during the month to determine the scope of work required to enable utilization in the Redox and Purex Plants of acid recovered in the UO₃ Plant.

CA-512 - 100-K Area Facilities

Work continued during July on CA-512, Revision 4, which includes the modification and installation of various facilities in the 100-K Reactor Area. Design of the Gamma Water Monitoring System for 105-KW and KE advanced to 97% complete. One drawing for this system remains to be completed upon receipt of vendor information.

CA-513 - Purex Separations Facility

Detailed design for the provision of an additional remote crane for the Purex Plant, together with necessary building modifications to provide maintenance facilities for the new crane, advanced to 28.5% complete during the month.

CG-558 - Reactor Plant Modification for Increased Production

Design activity during the month on Project CG-558 included minor design revisions to accommodate field conditions, such as preparation of a drawing for a new effluent line expansion box to replace an existing expansion box which is too "hot" to work on, and review of vendor drawings for the 151-F substation.

CG-621 - Redox Contamination Control Facilities

Detailed design for Project CG-621 was completed in March on the basis of the original scope of the project. During July, design work was completed for the in-cell ozonization gamma monitor provided for by Revision Request No. 2.

CG-638 - Alum Activated Silica Water Treatment Facilities - Phase II

Design of activated silica addition facilities for the 100 Areas was suspended in January pending a decision on the use of another additive (Separan) which is currently undergoing in-pile testing.

CG-642 - Design of Continuous Charge-Discharge Equipment - C Reactor

Detailed design of full-scale continuous charge-discharge equipment for C Reactor was 45.5% complete at the end of July. This is a reduction from the design progress reported in June and reflects the addition of 38 drawings to incorporate features to assure compatibility of design of full-scale charge-discharge equipment for C Reactor with that of the 112 tube demonstration installation being provided by Project CG-651.

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CG-643 - Redox Capacity Increase - Phase III

Work continued during the month on the preparation of design scope for Redox Capacity Increase - Phase III. A revised project proposal for Project CG-643 was awaiting Management approval at the end of July. The purpose of this revised proposal is to request authorization of additional work within currently approved funds. This work includes provision of new jumpers and dunnage necessary for installation of the existing spare D-6 condenser, and modification of the spare 2-B column.

CG-644 - Silica Gel Tail-End Treatment Facilities - Purex

Detailed design of silica gel tail-end treatment facilities for the Purex Plant was 90% complete at the end of July.

A revised project proposal for Project CG-644 was transmitted to HOO-AEC on July 24, 1956. This revised proposal states that construction of these facilities is not justified at this time but that a design package should be completed to provide for construction at a later date, if necessary.

CG-647 - Back-Up Radioiodine Removal Facilities - Purex

Detailed design of back-up radioiodine removal facilities for the Purex Plant was completed in June. During July, review of bids for engineered equipment and approval of vendor drawings was continued.

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

Review of bids for engineered equipment and approval of vendor drawings was continued during the month for auxiliary radioiodine removal and nitric acid recovery facilities for the Redox Plant. Detailed design of these facilities was completed in May.

CG-653 - Modifications - Redox Cooling Water Disposal

At the end of July, detailed design of facilities to provide for segregation and separate disposal of Redox process cooling water and steam condensates was 98% complete.

CG-654 - Advance Design - Reactor Plant

Work continued during the month on the preparation of a limited scope package for a new plutonium producing reactor embodying a recirculation cooling system. Design criteria for the thermal shield, biological shield, ball safety system, and pile gas system were approved by the Design Council during July.

CG-655 - Crib Methods Selection Tests

A project proposal, dated September 12, 1955, requested authorization of \$100,000 for a program to determine positive disposal capacity criteria to be used for site selection and design of facilities for the disposal to the ground of liquid wastes. AEC Work Authority No. 151-B (2) dated April 12, 1956, authorized

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initiation of preliminary work on this program as a part of Advanced Engineering for Fiscal Year 1958. During July, this program was established as a separate project and authorized funds for this work were increased to \$100,000 by AEC Directive No. HW-376, dated July 20, 1956.

CG-657 - Improvements to Redox Plant Ventilation System

Detailed design of improvements to the Redox Plant Ventilation System, consisting of two portable ventilation filter units for the Redox canyon and an enclosure for the Redox canyon crane electrical switchgear, advanced to 80% complete during the month.

CG-660 - Modifications and Additions to the Metallographic Cell - Radiometallurgy Building

At the end of July, detailed design of equipment modifications and additions to the metallographic cell in the Radiometallurgy Building, 300 Area, was 15% complete. A design progress schedule for Project CG-660 was in preparation at month's end.

CG-661 - Additional Heat Generation Facility - 189-D Building

Studies were continued during the month to determine the most effective and economical method of supplying additional heat generation capacity in the 189-D Building.

CG-663 - Steam Driven Auxiliaries - Buildings 165-KE and 165-KW

Detailed design of steam driven auxiliaries and associated equipment for Buildings 165-KE and 165-KW advanced to 71% complete during July. Requisitioning has been completed for all steam auxiliary equipment, and bids were reviewed for the boiler feed water pumps during the month.

CG-664 - 350° C Flow Loop - 314 Building

At the end of July, detailed design of a recirculating flow loop to be installed in the 314 Building, 300 Area, for use in corrosion testing of fuel element jacketing materials was 45% complete.

CG-665 - Metal Loading Facilities - 100-B, D, DR, F and H Areas

Detailed design of an auxiliary, non-personnel, elevator for use in metal charging in each of the 105-B, D, DR, F and H Buildings was 6.5% complete at the end of the month. A design progress schedule for Project CG-665 was approved by HOO-AEC on July 20, 1956.

CG-666 - Zone Temperature Monitoring - 100-B, C, D, DR, F and H Areas

Based on a revised design progress schedule which was approved by HOO-AEC on July 3, 1956, detailed design of zone temperature monitoring facilities for 100-B, C, D, DR, F and H Areas was 65.5% complete at the end of July.

CG-672 - Monochromatic Neutron Beam Facility

Detailed design of a monochromatic neutron beam facility for installation in the 105-KE Reactor advanced to 55% complete during the month.

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

At the end of July, detailed design was 10% complete for an exo-reactor high pressure, high temperature recirculating test loop to be installed in Building 1706-KE for use in testing the functional abilities of various water plant components. A design progress schedule for Project CG-674 was approved by HOO-AEC on July 11, 1956.

CG-676 - Fuel Element Pilot Plant - Semi-Works

Detailed design for the installation of a semi-works facility in the Fuel Element Pilot Plant, 300 Area, for the production of lead-dip processed internally and externally cooled fuel elements advanced to 89% complete during the month. A revised project proposal requesting total project funds of \$400,000 was approved by HOO-AEC during July.

CG-681 - Hanford Equipment in the ETR

At the end of July, work was in progress on the preparation of design scope for the installation in the Engineering Test Reactor (ETR) at the National Reactor Testing Station, Arco, Idaho of facilities for testing various fuel element designs and fabrication methods.

CG-682 - High Level Examination and Cut-Off Cell - 327 Building

Funds in the amount of \$16,500 were authorized in June by HOO-AEC for the design of a high level examination and cut-off cell for installation in the Radio-metallurgy Building, 300 Area. Design Section effort during July included work on the preparation of design scope, and planning for project proposal action to request authorization for additional scope of work and total project funds.

CA-683 - Relocation of Purex Cooling Water Swamp

During June, funds in the amount of \$8,500 were authorized to the General Electric Company in connection with Project CA-683, which provides for the relocation of the Purex cooling water swamp from the present area east of the 202-A Building to a natural depressed area south of Gable Mountain. These funds are for engineering services and design liaison to guide an architect-engineer, who will perform the detailed design for this project under contract with HOO-AEC. On July 16, a contract was entered into between HOO-AEC and the architect-engineering firm of Gray and Osborne of Yakima.

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

Detailed design was started during July and was 5% complete at the end of the month for the provision of additional in-line analytical instrumentation for improved process control in the Redox and Purex Plants. A design progress schedule for Project CG-686 was transmitted to HOO-AEC on July 27, 1956.

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CA-688 - Additional Waste Disposal Facilities - BC Area

On June 7, 1956, a project proposal was forwarded to HOO-AEC requesting \$216,000 for the provision of additional waste disposal facilities for scavenged TBP Plant wastes, to be located west and southwest of the BC crib area. It was proposed that this work be performed in three phases: Phase I consists of three ditches approximately 500 feet long and ten feet wide at the bottom, with associated piping and fencing, and three test wells; Phase II and III each include six additional ditches similar to those in Phase I.

On June 19, 1956, funds in the amount of \$16,200 were authorized to the General Electric Company by HOO-AEC for design of the entire project, and for Title III inspection and piping tie-ins by Minor Construction for the Phase I work described above. On July 30, 1956, a request was forwarded to HOO-AEC (letter A. B. Greninger to H. H. Schipper) requesting that the AEC work authority be revised to authorize the General Electric Company an additional \$5,000 to perform Title III inspection and management of Minor Construction forces for the Phase II portion of the project.

During July, design was completed for the Phase I and II portions of the project. The over-all design completion status of the project at the end of the month was 64% complete. A design progress schedule for Project CA-688 was approved by HOO-AEC on July 11, 1956.

CG-691 - Improved Task I and Task II Facilities - 234-5

During July, funds in the amount of \$175,000 were authorized for initiation of design and advance procurement for improved, continuous Task I and Task II facilities in the 234-5 Building. This constitutes an interim authorization pending the submission of a revised project proposal requesting total project funds.

D.O. A-00355 - Modifications to Redox Plutonium Concentration Building, 233-S-
Project Proposal (CG-692)

On July 24, 1956, a project proposal was forwarded to HOO-AEC for approval requesting authorization of \$98,000 for modifications to the Redox Plutonium Concentration Building, 233-S, to correct inadequacies in the ventilation system, maintenance facilities, and product and recycle can storage space.

D.O. A-00453 - Installation of Water Meters - Richland

Preparation of a lump sum bid package of drawings and specifications was 47% complete at the end of July for the installation of water meters on lines to all residences and private commercial facilities in Richland, to 700 Area industrial buildings, and to Central Stores and Transportation Buildings.

DESIGN WORK COMPLETED DURING JULY

D.O. A-07272 - Ball 3X Replacement Valves, 105-C
D.O. A-12474 - 221-U Jumper Design
D.O. A-14179 - Ion Exchange Prototype - Structural Support Drawings
D.O. A-18731 - Redox Plant - Design for Seals on Silo Wall

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DESIGN WORK COMPLETED DURING JULY (continued)

D.O. A-18962 - New Critically Safe 2AF Feed Tank
D.O. A-25103 - 105-H Charge-Discharge Elevator Decks
D.O. A-26412 - Modifications to Process Tube Wrap-Up Machine
D.O. C-85551 - Design Nagle Base Plate - 234-5 Building
D.O. C-85557 - Jumper Design - 2704-Z
D.O. C-93770 - 105-B Ventilation Study
D.O. F-107 - 105-DR Tube Push-Pull Mandrel

INVENTIONS

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

RH Beaton
Manager - Design
ENGINEERING DEPARTMENT

RH Beaton:HDT:vjm

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PROJECT SECTION

July 1956

I. SUMMARYA. Organization and Personnel

Following is a summary of personnel changes in Project Section during the month:

	<u>June 30, 1956</u>	<u>July 31, 1956</u>	<u>Net Change</u>
Employees on payroll	331	328	-3
Technical Graduates, Rotational	6	3	-3
College juniors	1	1	

The end-of-month status involved these changes:

	<u>Project Section</u>	<u>Technical Graduates Rotational</u>	<u>College Juniors</u>
Payroll additions	4		
Payroll removals	9		
Transfers into Section	6		
Transfers from Section		3	

Of the three exempt positions open, two were filled by transfers during the month, and the third position was to be filled as of August 1, 1956. Concurrent with preparations for transfer on August 13, 1956, of certain procurement and construction material functions from Minor Construction to the J. A. Jones Company, assignments are being obtained for the nonexempt employees now engaged in these functions. Of the 35 people concerned, six have accepted employment with the J. A. Jones Company, 25 have been placed with General Electric Company, one is on illness leave, and three are available for assignments.

B. Scope of Activities

At the end of the month, construction completion status of major process facilities was as follows:

<u>Project No.</u>	<u>Title</u>	<u>Completion</u>	
		<u>Scheduled</u>	<u>Actual</u>
CA-512	100-K Area Facilities, Revisions #3 and #4	100% ^a	100% ^a
CA-512	1706 KER Recirculation Facilities	98%	96%
CA-513-E	Purex Facilities, Part E	54% ^b	52% ^b
CA-546	Fuel Element Pilot Plant	100%	99%
CG-558-I	Reactor Plant Modifications	68%	66%
CG-558-II	Reactor Plant Modifications	30%	13%

a Complete except for revisions and start-up items.

b Includes work on installation of second remote crane.

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Project No.	Title	Completion	
		Scheduled	Actual
CA-586	First Capacity Increase, 230 KV System	100% ^c	100% ^c
CG-598	Purex Acid Fractionator	94%	65% ^d
CG-600	100-C Alterations	5%	0.8%
CG-613	Hanford 4X Program, Metal Conversion Plant	65%	72% ^d
CG-621	Redox Contamination Control Facilities	74%	54%
CG-643.	Redox Capacity Increase, Phase III	90% ^e	90% ^e
CG-647	Back-up Radioiodine Removal Facility, Purex	Not sch.	3%

C. Craft Labor

Construction progress was generally impeded by shortage of craftsmen and unbalanced craft crews. Priorities for use of labor were continued on major projects to the degree that craftsmen were available. The primary concern on Minor Construction work was the critical shortage of welders. This shortage was partially counteracted by the execution of a fixed-price contract for shop fabrication of front face piping to be used in 100-D, DR, F, and H Areas. The present welder strength is being increased by additional qualifications according to HAPO standards, and the total work force is being enlarged correspondingly. The pace of this build-up is being considered as a key factor in scheduling plant shutdowns.

D. Safety and Security

The regular meetings were continued by all components for discussions of safety, security, and health topics. The emphasis was continued on safety and security procedures to be observed during vacation periods. Internal security measures have been effective to the degree that only two security violations occurred during the first half of calendar year 1956. Minor Construction has resumed full-scale field safety programs, including area mass meetings, foremen's meetings, and special hazards orientations. As of July 22, 1956, Minor Construction forces had completed 738,062 man-hours without a disabling injury.

E. Highlights

Inspection Sub-Section

The steel strike exerted temporary limitations on all HAPO orders except those that are being fabricated by independent steel mills. However, these limitations will be reduced by settlement of the steel strike. The order for Resistoflex connectors was almost completed, and work on the Titeflex connectors is gaining momentum. One order of steel for the spare Purex concentrators was rejected and subsequently allocated for the fabrication of less critical equipment. New steel was ordered for the spare concentrators. The total work load for inspection continued the gradual decrease to a total of 429 orders for items requiring inspection as of July 31, 1956. Of these, 384 were assigned for inspection as follows: off-site inspectors, 305; on-site inspectors, 66; and government agencies, 13. Testing under the Corrosion Evaluation Program decreased slightly to 241 Huey tests, 69 oxalic acid tests, 32 macro-micro tests, and 14

- c Closed out as of July 31, 1956, with exceptions.
- d To be rescheduled when labor situation is firm.
- e For work now authorized by interim authorization.

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chemical determinations. The surplus of work for on-site inspection has been reduced substantially. The responsibility for inspection of zirconium items has been transferred to the using departments. A contract administrator is now responsible for the technical direction and acceptance of zirconium orders.

Minor Construction Sub-Section

Final preparations were made for the transfer on August 13, 1956, to the J. A. Jones Company, of responsibilities for procurement of construction materials, warehousing, material control, and other related functions. Placement of the personnel concerned was essentially accomplished during July 1956. Minor Construction work assignments were continued on a priority basis, in spite of a general shortage of craftsmen and some unbalanced craft crews. New assignments were received on two projects and 37 work orders. Work was completed on two projects and 33 work orders. The total amount authorized to Minor Construction at the end of the month was \$14,935,163, of which \$7,950,458 has been expended or committed. A new recapitulation of the small tool inventory was started to correct inconsistencies in the March 1956 inventory and to provide a more comprehensive listing of all items. This summary is to be completed in early August 1956.

Project Engineering Sub-Section

Engineering and construction functions were continued on a priority basis, with top priority being assigned to the Metal Conversion Plant. The rescheduling of work sequences was continued on all major projects, with due regard for manpower and optimum proportions among the various crafts. Approximate schedules are being estimated as work progresses, and as shutdowns can be anticipated. The fixed-price contractor for the installation of acid feed equipment started work on July 23, 1956. The fixed-price contractor for Phase II of CG-558 has revised construction schedules to show completion of 190-F Annex on January 8, 1957, and 190-H Annex on March 10, 1957. Project CA-586, First Capacity Increase, 230 KV System, was closed out with exceptions. On CG-558, Reactor Plant Modifications, the fixed-price contract portion of the 190-B Annex was completed as of July 12, 1956. Considerable engineering study and testing were applied to the cavitation problem in the high-pressure pumps for Reactor Plant Modifications. Further tests are planned for a 90-day period of operation, using modified impellers.

Project Service Sub-Section

Participation in the detailed reorganization study was continued, and interviews were scheduled for nonexempt employees who have not yet been placed in new organizational components. The 35 Minor Construction employees previously engaged in material procurement and warehousing functions have likewise been reassigned with three exceptions. Cost and expenditure data were compiled for FY 1956. Estimating Unit completed 23 estimates, comprising the following: study, 11; fair cost, six; project proposal, four; and construction, two. Field Surveys provided field services on nine orders for HAPO plant areas and two in Richland, including the Suburban Land Survey. Reproduction output and the Engineering Files work load decreased for the total period; however, the daily rate remained almost level. A meeting was held to study and discuss a program of microfilming all tracings, and to establish area files with microfilm records. The largest orders processed were for Reactor Plant Modifications, the 100-C Alterations, and the Zone Temperature Monitoring projects.

G. Monthly Report of Inventions or Discoveries

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

None.

For Manager - Projects

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DECLASSIFIEDII. STATISTICAL AND GENERALPROJECT INDEX

<u>100 Area Projects</u>		<u>Project No.</u>	<u>Page</u>	<u>Project No.</u>	<u>Page</u>
<u>Project No.</u>	<u>Page</u>				
CA-548	6	CA-675	24	IR-202	38
CG-579	6	CA-683	24	IR-204	38
CA-586	6	CG-686	24	Job 0069	39
CG-616	7	CA-688	25	Job 0070	39
CG-638	7	CG-692	25	Job 0076	39
CG-656	8	CA-693	25	Job 0078	40
CG-661	8	IR-203	26	ER-3122	40
CG-665	8	IR-207	26	ER-3134	40
CG-667	8	IR-211	26	ER-3139	40
CG-689	9	ER-2788	27	ER-3145	41
ER-1238	9	ER-2790	27	ER-3152	41
ER-E-492	9	ER-2791	27	ER-3153	41
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		ER-2793	27	ER-3155	42
		ER-2794	28	ER-3157	42
		ER-2796	28	ER-3158	42
				ER-3159	42
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				ER-3169	43
				ER-4001	43
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				AEC-153	44
<u>Other 100 Area Projects</u>		<u>300 Area and General Projects</u>			
<u>Project No.</u>	<u>Page</u>	<u>Project No.</u>	<u>Page</u>		
CA-512*	10	CA-546	29		
CA-512**	11	CA-590	29		
CG-558	12	CA-601	30		
CG-558	12	CG-614	30		
CG-600	14	CA-615	30		
CG-642	14	CG-618	31		
CG-663	14	CG-620	31		
CG-666	15	CG-630	31		
CG-672	15	CA-633	32		
CG-674	15	CA-639	32		
CG-678	15	CA-641	33		
		CG-646	33		
		CA-649	33		
		CA-650	34		
		CA-652	34		
		CG-658	34		
		CG-659	34		
		CG-660	35		
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		CA-670	35		
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		CG-673	36		
		CG-676	36		
		CA-677	36		
		CG-680	37		
		CA-685	37		
		CA-690	37		
		IR-200	37		

* Excluding 1706 KER
 ** 1706 KER Facilities

CA-548 - New VSR Test Tower

Directive Completion Date: March 1, 1957
 Total Authorized Funds: \$125,000 - GE \$16,500 - AEC \$108,500
 Total Estimated Cost: \$125,000

By letters dated June 27, 1956, and July 3, 1956, the Commission was requested to supply a new directive and work authority to the General Electric Company for this project, based on recommended minor design changes, methods of accomplishing the work, allocation of funds, and rescheduling. In the recommendations, the General Electric expenditure was listed as \$10,554 instead of \$16,500 as previously authorized.

CG-579 - Effluent Water Monitoring Improvements - 100-C

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Field Progress:			
P.F.	100%		
Total		82%	78%
Average Manpower:			
P.F. 9		Approx. Accumulated Manpower: (man-days)	
		P.F. 750*	

Directive Completion Date: September 1, 1956
 Total Authorized Funds: \$168,000
 Total Estimated Cost: \$168,000

Scoping, preliminary and detailed design are the responsibility of the Design Section.

All tubing runs with the exception of tie-ins have been completed in the near side sample room. Electrical conduit and leads have been installed in both near and far side sample rooms. It is presently estimated that the switch-over from the existing Beta system to the new Gamma system will take place in the near side sample room approximately August 1, 1956.

* Corrected to show actual man-days expenditure.

CA-586 - First Capacity Increase - 230-KV System

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual*</u>
Detailed Design:		100%	100%
Field Progress:			
BPA	44.4%	100%	100%
F.P.	52.0%	100%	100%
M.C.	2.0%	100%	100%
P.F.	1.6%	100%	100%
Total		100%	100%

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CA-586 - First Capacity Increase - 230-KV System (Con't)

Average Manpower:

F.P. 2
M.C. 2

Approx. Accumulated Manpower: (man-days)

M.C. 985
P.F. 90

Directive Completion Date: August 1, 1956

Total Authorized Funds: \$1,100,000 - GE \$119,500 - AEC \$980,500

A preliminary inspection of the line was held on July 16, 1956.

W. L. Ridge Construction Company - The contractor has completed most of the "Cadwelding." The fencing contractor has placed all post and has started installation of fabric.

Casey Electric Company - The contractor installed the bushing potential devices, delivered the three disconnect switches to Gable Mountain, and finished the pre-assembly of switch tower for the line disconnect #2.

Minor Construction - Installation of the two inch conduit in the 151-KW sub-station is complete.

*General - The project was completed with exception as of July 31, 1956. Information pertinent to the issuance of a Physical Completion is being assembled.

CG-616 - Installation of Acid Feed Equipment, 100-B,D,DR,F and H Areas

	<u>Weighted</u>	<u>Actual</u>
Field Progress:		
F.P.	92.7%	1%
M.C.	4.3%	8%
Total		10%

Directive Completion Date: October 1, 1956

Total Authorized Funds: \$400,000

Total Estimated Cost: \$470,000

Scoping, preliminary and detailed design are the responsibility of the Design Section.

Work was started by the Hoffman Construction Company on July 23, 1956.

CG-638 - Alum Activated Silica Water Treatment Facility - Phase II

Directive Completion Date: April 1, 1957

Total Authorized Funds: \$275,000

Total Estimated Cost: \$275,000

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CG-638 - Alum Activated Silica Water Treatment Facility - Phase II (Con't)

Scoping, preliminary and detailed design are the responsibility of the Design Section.

All work on this project suspended pending field evaluation of "Separan."

CG-656 - Installation of Raw Water Cross-Tie, 105-C

Directive Completion Date: February 1, 1957
Total Authorized Funds: \$25,000
Total Estimated Cost: \$25,000

The estimated cost of this project is being reviewed since procurement costs exceed allowance by \$1,260 and the Design and Engineering costs exceed allowance by \$2,000.

Material procurement should be complete by early August 1956.

The preparatory phases of this project are being scheduled for an early completion.

CG-661 - Additional Heat Generation Facility - 189-D Building

Total Authorized Funds: \$22,400
Total Estimated Cost: Not Established

Detailed design is the responsibility of the Design Section.

CG-665 - Metal Loading Facilities - 100-B, D, DR, F and H Areas

Directive Completion Date: November 1, 1957
Total Authorized Funds: \$150,000
Total Estimated Cost: \$150,000

Bids were received for the elevators and are now being reviewed.

CG-667 - Improved Space Utilization - 105-B, D and F Building

Directive Completion Date: September 30, 1957
Total Authorized Funds: \$212,000
Total Estimated Cost: \$212,000

Work Authority PM-3251 was issued on July 16, 1956.

Design and construction engineering for the fixed-price contractor's portion of the work will be performed by an architect-engineer.

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HW-4458 DEL

CG-667 - Improved Space Utilization - 105-B, D and F Building (Cont.)

Work authorized the General Electric Company:

1. Design, procurement and construction engineering for Minor Construction work.
2. Management of the project work performed by the fixed-price contractor, architect-engineer and Minor Construction forces.

CG-689 - Slug Saw and Etching Equipment

Project Preparation: 100% Scoping: 100%

Total Estimated Cost: \$100,000 to \$200,000

The project proposal requesting design funds in amount of \$47,750 is awaiting authorization.

ER-1238 - Central Semi-Automatic Dummy Decontamination Facility

Scoping: 100%

Total Estimated Cost: \$230,000

The project proposal was circulated for review and comment. Revisions to the text and cost estimate are being made.

It is anticipated that the project proposal will be routed for approval signatures during the initial part of August 1956.

ER-E-492 - Aerial Line Relocation - 107-B, C, D, DR and F

Total Authorized Funds: \$ 1,500

Total Estimated Cost: \$216,000

It is planned to close out this engineering request.

SECRET

Fe-9

CA-512 - 1952 Reactor Expansion - 100-K Area Facilities

Total Authorized Funds: \$157,500,000 - GE \$28,210,000 - AEC \$129,290,000
 Total Estimated Cost: \$157,500,000

Revision #5

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:		Not Established	98%
Field Progress:			
F.P.	8.72%	78%	10%
M.C.	43.30%	93%	87%
P.F.	47.98%	79%	70%
Total		85%	72%

Average Manpower:	Approx. Accumulated Manpower: (man-days)
F.P. 4	F.P. 179
M.C. 13	M.C. 4742
P.F. 11	P.F. 4137

Directive Completion Date: May 1, 1955

A new Work Authority for Project CA-512 has been received from the Commission. This Work Authority supersedes all previous authorities and itemizes the remaining work to be performed in the K Area, and includes items requested in Rev. 5 to Project Proposal CA-512. The completion date February 28, 1957, has been agreed upon for the remaining work.

A Notice of Award has been given to Hopkins Construction Company for the installation of the Dowtherm Heating System and Related Work in the 1706-KE building. This now makes a total of three fixed price construction contracts in the K Area with the fourth, Acid Feed System, out for bid. All other work is being done with work orders to Plant Forces and Minor Construction.

Plant Forces: One of the six backwash valves, which were recently discovered to be leaking, has been dismantled and inspected. One of the valve discs was found to be cracked in the same location as the twenty-three which have already been replaced. This valve was one of those which had been provided with a stop collar. It was not possible to determine if damage had been started prior to installation of the collar.

Four prototype ball recovery nozzles have been tested. None of the four will satisfy the necessary requirements, and four new prototypes are being fabricated.

Two Carpenter 20 stainless steel tees installed in the Activated Silica System have failed due to porosity. These will be sectioned for metalurgical examination preparatory to requesting replacement by the vendor.

The prototype Vertical Safety Rod modifications have been submitted to Design for Design approval prior to authorizing complete modification of all rods.

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CA-512 - 1952 Reactor Expansion - 100-K Area Facilities (Continued)

Forty boards of temperature monitoring lead length compensating resistors have been installed; 627 boards have been received from the vendor. There are four resistors per board.

Turrets for K Area Gamma Monitoring System have been aligned in 105-KE. Copper tubing runs are approximately 30% complete in 105-KW.

Minor Construction: All of the 107 tanks in KW Area have been raised, shimmed and grouted. The steel band has been installed around the foundations of tanks A and B. In 107-KE Area, C tank has been raised and shimmed; lifting lugs are being welded onto B tank. Estimated completion date is August 24.

The pilot light, igniter and fire eye have been installed on steam generator #3 in 105-KE Area. Testing and adjustment of this unit cannot be accomplished for approximately two weeks or until routine maintenance has been completed on this unit.

The temperature monitoring controller enclosure is 90% complete in 105-KW and 50% complete in 105-KE.

Fixed Price Contracts: Installation of the piping for the 1704 Ventilation System is proceeding. The ventilation ducts have been insulated and the duct heaters installed. Painters have started preparatory work.

The Acid Feed System has been designed by W. C. Nickum & Sons and has been submitted to the Commission for a bid package. Invitation of Bids are out and opening has been rescheduled. Title III work has been awarded to General Electric Company.

CA-512 - 1952 Reactor Expansion - 100-K Area Facilities - 1706-KER Rec. Loop

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Field Progress:			
F.P.	60%	98%*	96%
M.C.	40%	98%	96%
Total		98%	96%

Average Manpower:	Approx. Accumulated Manpower: (man-days)
F.P. 26	F.P. 4039
M.C. 6	M.C. 2872

Directive Completion Date: September 1, 1956

The electrical power tie-in at 105-KE for this facility is scheduled to be performed during the next outage.

The calibration of instruments is proceeding and acceptance tests are under way.

*Per revised schedule.

SECRET
Fe-II

CG-558 - Reactor Plant Modifications for Increased Production - Phase I

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Field Progress:			
F.P.	40.88%	90%	88%
M.C.	51.82%	53%	49%
P.F.	7.88%	53%	69%
Total		68%	66%

Average Manpower:	Approx. Accumulated Manpower: (man-days)
F.P. 130	F.P. 36604
M.C. 236	M.C. 85600
P.F. 51	P.F. 4791

Directive Completion Date: December 15, 1957
 Total Authorized Funds: \$25,900,000
 Total Estimated Cost: \$25,900,000

Scoping, preliminary and detailed design are the responsibility of the Design Section.

Minor Construction: There is still a shortage of fitter-welders. This is being relieved somewhat by awarding some fabrication of piping to Bay Company on a unit cost basis. Fitter-welder requirements for Minor Construction are being re-evaluated in the hopes of establishing firm shutdown schedules.

Fixed Price Contractors: The cavitation test on the 190-B pump was run Saturday, July 21, and the examination after the run indicated there was still some cavitation damage to the paint. No further running is anticipated with this particular set of impellers at this time; however, the rotor from one of the "H" pumps which has been reshaped and tested at Trenton will be installed and run in the near future.

CG-558 - Reactor Plant Modifications for Increased Production - Phase II

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Field Progress:			
F.P.	56.00%	45%	15%
M.C.	40.81%	13%	9%
P.F.	3.19%	8%	2%
Total		30%	13%

Average Manpower:	Approx. Accumulated Manpower: (man-days)
F.P. 122	F.P. 9008
M.C. 37	M.C. 9435
P.F. 0	P.F. 73

Directive Completion Date: December 15, 1957
 Total Authorized Funds: \$11,200,000
 Total Estimated Cost: \$11,298,200

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HW-44580 **DEL**

CG-558 - Reactor Plant Modifications for Increased Production - Phase II (Con't.)

Scoping, preliminary and detailed design are being managed by the Design Section.

Minor Construction: There is still a shortage of fitter-welders. This is being relieved somewhat by awarding some fabrication of piping to Bay Company on a unit cost basis. Fitter-welder requirements for Minor Construction are being re-evaluated in the hopes of establishing firm shutdown schedules.

Fixed Price Contractors: Revised construction schedules were submitted by Morrison-Knudsen Company, showing 190-F Annex complete January 8, 1957, and 190-H Annex complete March 10, 1957. These schedules have been forwarded to the AEC.

CG-600 - 100-C Alterations

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Field Progress:			
M.C.	80.4%	1%	0 %
P.F.	19.6%	18%	1 %
Total		4%	0.8%

Directive Completion Date: April 15, 1957
 Total Authorized Funds: \$675,000
 Total Estimated Cost: \$765,000

Scoping, preliminary and detailed design are being managed by the Design Section.

A revised project proposal has been submitted to the Commission for approval.

CG-642 - Continuous Charge-Discharge Facility - 105-C

Scoping: 100%

	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:	42%	45.5%*

Total Authorized Funds: \$200,000 (Interim Authorization)
 Total Estimated Cost: Not Established

Detailed design, including procurement of equipment components for testing purposes, is the responsibility of the Design Section.

Detail design is proceeding and detail drawings are being reviewed for approvals.

*Detailed design rescheduled.

CG-663 - Steam Auxiliaries for the 165-K Steam Generators

	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:	38.7%	71%

Directive Completion Date: August 1, 1957
 Total Authorized Funds: \$555,000
 Total Estimated Cost: \$555,000

Requisitions are being prepared and processed for engineered equipment. Detail design is proceeding.

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CG-666 - Zone Temperature Monitoring - 100-B, C, D, DR, F and H

Directive Completion Date: January 1, 1958
Total Authorized Funds: \$900,000
Total Estimated Cost: \$900,000

Scoping and detail design are the responsibility of the Design Section.

Procurement is progressing and drawings have been completed for release to the field.

CG-672 - Monochromatic Beam Neutron Spectrometer

Directive Completion Date: June 30, 1957
Total Authorized Funds: \$112,000
Total Estimated Cost: \$112,000

Scoping, preliminary and detailed design are the responsibility of the Design Section.

Comment drawings are being reviewed.

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

Directive Completion Date: December 31, 1957
Total Authorized Funds: \$125,000
Total Estimated Cost: \$125,000

Scoping, preliminary and detail design are the responsibility of the Design Section.

Discussions have been held on the methods of procurement of zero leakage pump and remainder of the loop equipment and piping.

CG-678 - Laboratory Facilities for the Special Irradiation Studies

Project Preparation Complete: 100% Scoping: 100%
Total Estimated Cost: \$45,000

This project was approved by the Commission June 21, 1957. Authorization has not yet been issued.

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HW-44580 DEL

CA-513-A, B, C & D - Purex Facility - Expansion of 200 Areas Facilities

Total Authorized Funds: \$79,450,000 - GE \$7,972,000 - AEC \$71,478,000
Total Estimated Cost: \$79,450,000

The CA-513-B, C, and D portions of this project are complete. The following items remain to be accomplished:

- a. Fabrication (by Steel and Alloy Tank Company, Newark, New Jersey), insulation and mock-up on site of two (2) spare concentrators. Material delivery will delay these vessels until after the first quarter of 1957.
- b. Paving of miscellaneous roads and walks in the vicinity of the 202-A Building.
- c. Installation of miscellaneous valves and controls for the Failed Equipment Disposal Tunnel. A work order has been issued to Minor Construction. Procured items are now on site.
- d. Modification of the gamma monitor on steam condensate header which is now inoperable because of high temperatures around the scintillation element. Design is complete. Minor Construction has started excavation.
- e. Installation of electric heaters in series with present steam heaters on dissolver off-gas stream. Estimated cost is \$125,000. Atomic Energy Commission concurrence has been given.

CA-513-E - Purex Facility - Expansion of 200 Areas Facilities

	<u>Scheduled</u>	<u>Actual</u>
Field Progress: *		
Total	54%	52%

Directive Completion Date: April 1, 1958
Total Authorized Funds: \$3,100,000 - GE \$2,662,000 - AEC \$438,000
Total Estimated Cost: \$3,100,000

Detailed design of a second remote crane and associated facilities is the responsibility of the Design Section.

Concurrence has been given by the Commission that the crane periscopes (except the slave crane viewing periscope) be procured in parts and assembled on site.

* Division of work between Minor Construction and the fixed-price contractor cannot be determined until detail design is further along.

CG-598 - Purex Acid Fractionator

	<u>Weighted</u>	<u>Scheduled *</u>	<u>Actual</u>
Detailed Design:		100%	100%
Field Progress:			
F.P.	6.6%	100%	100%
M.C.	93.4%	93.5%	62.5%
Total		94%	65%

Average Manpower:	Approx. Accumulated Manpower: (man-days)
M.C. 10	M.C. 3,570

Directive Completion Date: September 1, 1956
 Total Authorized Funds: \$920,000
 Total Estimated Cost: \$920,000

Final pour on the structure was made July 13, 1956. Electrical work is still limited because of manpower shortage, and fitter work is essentially at a standstill for the same reason.

The carload of reboilers and barometric condenser from Lummus Company showed evidence of in-transit damage. Preliminary inspection by on-site inspection forces showed that small pipe (1/2", 1" diameter) and base plates on reboilers were bent varying amounts. More complete inspection is to be made when items are unloaded. The fractionator tower is expected to be on site by about August 15, 1956.

* Scheduled progress is based on the scheduled in effect before the last strike, consequently is obsolete. A new schedule cannot be made until a known force of electricians, fitters and welders is available.

CG-613 - Hanford 4X Program, Metal Conversion Plant

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Field Progress:			
F.P.	28.6%	86% *	87%
M.C.	70.2%	56%	64%
P.F.	1.2%	82%	82%
Total		65%	72%

Average Manpower:	Approx. Accumulated Manpower: (man-days)
F.P. 20	F.P. 4,950
M.C. 200	M.C. 11,600
P.F. 2	P.F. 487

Directive Completion Date: December 31, 1956
 Total Authorized Funds: \$4,000,000
 Total Estimated Cost: \$4,398,000

* Based on revised tentative construction schedule submitted to the Commission on July 16, 1956.

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HW-44580 DEL

CG-613 - Hanford 4X Program, Metal Conversion Plant (Con't)

Procurement - General

The modifications which were to be made on the screw conveyor by the vendor, per alteration to purchase order, have been cancelled because of vendor's inability to meet the requirements within the required time. The unit has been shipped to H.A.P.O., and the modifications are being made by Minor Construction.

Phase III - Construction for 224-UA Building

The work is complete. Ventilation balancing and acceptance testing are scheduled to start on July 28, 1956.

Phase IV - Contract for Railroad Loading Pad and Road

This phase of the project is complete.

Phase V - Maintenance Facility

A bid package is being prepared by the Commission. Bid opening date is scheduled by the Commission for late in August 1956.

Minor Construction Work

The work in the 224-U Building is virtually complete except for some insulation work, clean-up, etc., and the revised load-out facilities. Work on the revised load-out facilities started July 23, 1956.

The shielding wall is complete except for clean-up.

The first three calciners have been pressure tested. Piping, instrument and electrical work are rapidly being completed. A potential bottleneck occurred when it was learned that the contractor would require three (3) days to balance the air conditioning and exhaust systems in the 224-UA Building, during which time the building must be closed up tight. This would have severely handicapped the Minor Construction work. However, it is believed that the Commission will eliminate this situation by directing the contractor to do the balancing work in two (2) days on a week-end, so as not to interfere with the Minor Construction work.

The prototype calciner shaft seizure incident may make it advisable to modify the production calciners. The beneficial use date could be delayed depending on the amount of additional work which might be required.

General Project Status

A revised project proposal requesting additional funds and an extension of the completion date has been submitted for final signatures. A "Tentative Revised Construction Schedule, pending Approval of Project Proposal Revision 4," has been issued at the request of the Commission.

CG-613 - Hanford 4X Program, Metal Conversion Plant (Con't)General Project Status (Con't)

An additional interim release of \$176,200 has been made to Minor Construction. This represents all of the funds remaining of the currently authorized \$4,000,000, which are not committed or allocated for other purposes, and it is estimated that these will be fully expended by August 10, 1956. Additional funds must be authorized by this date. The funds ear-marked for the new Maintenance Building are \$1,000,000. The funds for the new Design Section are \$1,000,000.

CG-621 - Redox Contamination Control Facilities

	<u>Weighted</u>	<u>Scheduled *</u>	<u>Actual **</u>
Field Progress:			
M.C.	20.8%	84%	60%
P.F.	79.2%	71%	52%
Total		74%	54%
Average Manpower:		Approx. Accumulated Manpower: (man-days)	
M.C. 10		M.C. 1,443	
P.F. 1		P.F. 1,075	

Directive Completion Date: December 31, 1956
 Total Authorized Funds: \$765,000
 Total Estimated Cost: \$765,000

Scoping, preliminary and detailed design are the responsibility of the Design Section.

Letter proposal Revision #3 is in preparation to request extension of project completion date and reflect latest cost to complete estimate (no increase in total funds).

Modification to the J-6 Vent

Minor items such as pipe coding and clean-up remain to be done.

Contaminated Equipment Replacement

Vendors are experiencing difficulties in obtaining materials for vessel fabrication. The present steel strike will create additional difficulties.

* Construction schedule has been revised to reflect scheduling and cost outlined in letter proposal revision #3 now in preparation.

** Percent readjusted to more accurately reflect progress to date.

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HW-44580

CG-621 - Redox Contamination Control Facilities (Con't)

Canyon Washdown Facilities

Work has been continuing at a slow pace on drilling and capping of holes in the roof. Higher priority work has retarded progress somewhat; however, additional manpower on this phase of the project is expected shortly and, when obtained, completion of this phase should not be far behind.

CG-624 - Redox Railroad Tunnel Ventilation Barrier

	<u>Scheduled</u>	<u>Actual</u>
Field Progress:		
M.C.	*	8%
Directive Completion Date:	September 1, 1956	
Total Authorized Funds:	\$57,000	
Total Estimated Cost:	\$57,000	

* There has been no change in the status of this project. A priority list of the various projects has been established and work on this project is scheduled to resume during the fore part of August 1956.

CA-625 - Additional Waste Disposal Facilities - 200 Areas

Total Authorized Funds: \$55,000
Total Estimated Cost: \$55,000

Preliminary and detailed design, including field surveys, are the responsibility of the Design Section.

A revised Work Authority was received from the Commission on July 9, 1956, reducing the scope and funds.

CG-635 - Redox Stack Particulate Sampler

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Field Progress:			
M.C.	100%		5%
Average Manpower:	Approx. Accumulated Manpower: (man-days)		
M.C. 2		M.C.	30
Directive Completion Date:	August 1, 1956		
Total Authorized Funds:	\$40,000		
Total Estimated Cost:	\$42,000		

CG-635 - Redox Stack Particulate Sampler (Cont'd)

Detailed design is the responsibility of the Design Section.

Minor Construction started prefabrication of structural members for the stack sampler tower. This work is presently being used as a fill-in job for craftsmen assigned to CG-613 - Hanford 4X Program, Metal Conversion Plant.

A project proposal revision (being circulated for approval signatures within the General Electric Company) requests extension of time for completion of the project. Craftsmen have not started field construction due to the higher priority of other projects.

CG-636 - SWP Service Facilities - Redox

Total Authorized Funds: \$ 100 (Project Section)
Total Estimated Cost: \$157,000

The project proposal preparation is the responsibility of the Design Section.

The project proposal is being routed for approval signatures within the General Electric Company.

CG-643 - Redox Capacity Increase - Phase III

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Field Progress:			
M.C.	25%	75%	75%
P.F.	75%	95%	95%
Total		90%	90%
Approx. Accumulated Manpower: (man-days)			
		M.C.	193
		P.F.	206

Directive Completion Date: October 1, 1956
Total Authorized Funds: \$211,500
Total Estimated Cost: Not Established (approximately \$1,000,000)

Detailed design is the responsibility of the Design Section.

Higher priority work has prevented progress on modification of the second 2E Column by Minor Construction.

The request for additional funds for advanced procurement of critical materials and limited on-site fabrication is awaiting the Commission's approval.

Revision No. 2 to the proposal, calling for additional work to be performed within the presently authorized funds, is still being routed for approval signatures within the General Electric Company.

Scoping of the over-all project is nearing completion.

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HW-44580 []

CG-647 - "A" Plant Off-Gas Treatment Facilities

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Field Progress:			
F.P.	82.3%	0%	0%
M.C.	18.1%	18%	18%
P.F.	0.6%	0%	0%
Total		3.2%	3.2%

Average Manpower:	Approx. Accumulated Manpower: (man-days)
M.C. 15	M.C. 250

Directive Completion Date: September 15, 1957
Total Authorized Funds: \$1,150,000
Total Estimated Cost: \$1,150,000

Detailed design is the responsibility of the Design Section.

Excavation for building was completed by Minor Construction on July 18, 1956.

"Notice of Award" was given to Hoffman Construction Company on July 18, 1956.
"Notice to Proceed" to be given later. Contract Number is AT(45-1)-1138. The proportionate cost for Project CG-647 is estimated at \$228,803.

CG-648 - Auxiliary Radio-Iodine Removal and Nitric Acid Recovery Facilities - Redox

Directive Completion Date: September 15, 1957
Total Authorized Funds: \$870,000
Total Estimated Cost: \$870,000

Preliminary and detailed design are being managed by the Design Section.

Minor Construction has installed temporary radiation zone boundary markers and electrical outlet boxes at both the work site and at the area reserved for material storage and the contractor's clean temporary buildings.

The location of the 293-S Building has been staked and bench marks have been placed at strategic locations to facilitate elevation and location checks on this facility.

A fixed price contract, AT(45-1)-1138, was awarded the Hoffman Construction Company July 19, 1956, and the "Notice to Proceed" is to be issued at a later date.

Of the total \$436,230 bid for both the CG-647 and CG-648 projects, \$207,427 represents the CG-648 portion.

CA-653 - Redox Cooling Water Disposal

	<u>Weighted</u>	<u>Scheduled *</u>	<u>Actual</u>
Field Progress:			
F.P.	37%	100%	79%
M.C.	45%	80%	25%
P.F.	18%	80%	60%
Total		87%	51%

Average Manpower:

F.P.	12
M.C.	1
P.F.	0

Approx. Accumulated Manpower: (man-days)

F.P.	458
M.C.	130
P.F.	50

Directive Completion Date: September 30, 1956

Total Authorized Funds: \$225,000

Total Estimated Cost: \$225,000

Scoping, preliminary and detailed design are the responsibility of the Design Section.

The fixed-price contractor, Erwen Construction Company, has completed all coating work on the 10-inch and 12-inch steel pipe. A disagreement on whether certain testing of Somastic coating is contract work occurred, and the contractor is submitting a claim for extra expense.

Detailed design is complete with the issuance of the remaining jumper drawings.

* A revised project proposal changing the completion date has been submitted to the Commission. A revised construction schedule will be submitted when directive modification is received.

CG-657 - Improvements to Redox Plant Ventilation

Directive Completion Date: July 31, 1957

Total Authorized Funds: \$205,000

Total Estimated Cost: \$205,000

Detailed design is the responsibility of the Design Section.

Processing of requisitions for the portable ventilation filter units has been initiated. This timing should permit plant site delivery of these units in March of 1957.

CA-662 - 2101-M Building Conversion

Total Authorized Funds: \$ 2,000

Total Estimated Cost: \$123,500

The preparation of a scope revision to the subject proposal has been halted pending a clarification of future HAPO warehousing plans.

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HW-44580

CA-668 - Installation of Sprinkler System, 275-EA Building

Project Preparation: 100% Scoping: 100% Prelim. Design: 100%

Total Authorized Funds: \$ 2,000
Total Estimated Cost: \$26,800

The project proposal is being held without action pending a study and evaluation of the General Electric Company's warehousing requirements.

CA-675 - Change House Facilities - 275-W Building

Project Preparation: 100% Scoping: 100% Prelim. Design: 100%

Total Authorized Funds: \$ 4,800 - GE \$2,300 - AEC \$2,500
Total Estimated Cost: \$33,500

A contract has been negotiated with W. C. Nickum & Sons for design of the subject facility. This negotiation had been temporarily held up by the Commission due to contract technicalities.

CA-683 - Relocation of Purex Cooling Water Swamp

Project Preparation: 100% Scoping: 100% Prelim. Design: 100%

Total Authorized Funds: \$ 20,000
Total Estimated Cost: \$333,000

Preparation of the project proposal is the responsibility of the Design Section.

This project authorized for design only. An authorization has been received by the General Electric Company for work in accordance with scope, which includes survey work. However, the Commission has informed us orally that the architect-engineer (Gray & Osborne, Yakima, Washington, on Contract AT(45-1)-1153) will do the survey work. Therefore, General Electric is awaiting a new authorization with a new split of funds.

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

Directive Completion Date: December 1, 1956
Total Authorized Funds: \$550,000
Total Estimated Cost: \$550,000

Scoping, preliminary and detailed design is the responsibility of the Design Section.

Detail design started July 13, 1956.

SECRET
Fe-24

CA-688 - Additional Waste Disposal Facilities - BC Crib Area - Phase I

	<u>Weighted</u>	<u>Actual</u>
Field Progress:		
F.P. Trenches	60%	90%
F.P. Wells	38%	80%
M.C.	2%	0%
Total		84%
Average Manpower:	Approx. Accumulated Manpower: (man-days)	
F.P. 6		F.P. 75

Directive Completion Date: May 31, 1957
 Total Authorized Funds: \$216,000 - GE \$16,200 - AEC \$199,800
 Total Estimated Cost: \$216,000 - Phase I, II & III

Detailed design is the responsibility of the Design Section.

George Grant was awarded the contract for Phase I fixed-price work with a low bid of \$17,900.

Pipe work is in progress; excavation has been completed in two of the three trenches.

R. J. Strasser was given the contract for drilling the test wells, and has completed two of the three wells.

Preparation of bid package and completion of design for Phase II have been accomplished and forwarded to the Commission.

CG-692 - Modifications to Redox 233-S Concentration Building

Total Authorized Funds: \$ 150 (Project Section)
 Total Estimated Cost: \$98,000

Project proposal preparation is the responsibility of the Design Section.

The project proposal has been transmitted to the Commission and is awaiting authorization.

CA-693 - Alterations and Expansion of 2704-C Lunch Room and Office Facilities

Project Preparation: 100% Scoping: 100% Prelim. Design: 100%

Total Authorized Funds: \$ 1,500
 Total Estimated Cost: \$32,000

The project proposal is being routed for approval signatures within the General Electric Company.

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HW-44580

SECRET

IR-203 - Coating Waste Transfer Line, 241-S to 241-U

	<u>Actual</u>
Detailed Design:	100%
Directive Completion Date:	November 30, 1956
Total Authorized Funds:	\$17,800
Total Estimated Cost:	\$17,800

This project has not been started due to higher priority work.

IR-207 - Gantry Crane Facility - 241-A Tank Farm

	<u>Weighted</u>	<u>Actual</u>
Detailed Design:		100%
Field Progress:		
F.P.	36%	40%
M.C.	56%	100%
P.F.	8%	20%
Total		73%
Average Manpower:	Approx. Accumulated Manpower: (man-days)	
F.P. 1		F.P. 70
M.C. 0		M.C. 70
P.F. 0		P.F. 10

Directive Completion Date: January 31, 1957
Total Authorized Funds: \$17,600
Total Estimated Cost: \$17,600

The fixed-price contractor, Hoffman Construction Company, completed the base course and has hauled material for the leveling course. This contract was negotiated as a modification to an existing contract and will be completed in conjunction with roadwork on CG-613.

Minor Construction completed their portion of the project July 10, 1956.

Plant forces work has been delayed due to the priority of other shop orders.

IR-211 - Shelters for Regulated Docks - Purex (ER-2781)

Total Estimated Cost: \$16,500

Preparation of the informal request is the responsibility of the Design Section.

Informal Request was deferred by the Commission until the FY 1957 appropriations are made.

SECRET
Fe-26

ER-2788 - Reduction of Air Borne Noxious Fumes - 224-U Building

Total Authorized Funds: \$200

Project proposal preparation is the responsibility of the Design Section.

The Design Section is preparing a project proposal having a reduced scope consisting of a stack, condenser, and associated piping on top of the 224-U Building to reduce the noxious fume problem.

ER-2790 - Expansion of Decontamination Facilities, Hot Semiworks

Total Authorized Funds: \$100

Project proposal preparation is the responsibility of the Design Section.

The project proposal is still in the preparation stage. Work includes providing an 18 ft. x 24 ft. addition to the south side of the process building adjacent to the existing hot shop to provide additional decontamination facilities. Preliminary estimate indicates project cost will approximate \$40,000. There is some indication that the sponsor will cancel submission of the project due to its high cost.

ER-2791 - 221-B Fission Products Packaging Study

Total Authorized Funds: \$168

Information on scheduling and work force determination pertinent to a process engineering study on installing the subject facilities in the 221-B Building was transmitted to the Technical and Design Sections on June 15, 1956. No immediate action is being made on preparation of a project proposal. The ER number will be held open until September 1, 1956 in the event further work is requested on this study.

ER-2792 - Conversion of Recuplex to a Manufacturing Facility

Total Authorized Funds: \$250

Preparation of a project proposal is the responsibility of the Design Section.

Contacts regarding Work Determinations are being made to obtain the necessary information for the preparation of the project proposal estimate.

ER-2793 - Improved Recycle Hood - 233-S Building

Total Authorized Funds: \$150

Scoping, preliminary and detailed design are the responsibility of the Design Section.

SECRET
Fe-27

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ER-2793 - Improved Recycle Hood - 233-S Building (Con't)

Work on preparation of the project proposal by the Design Section has been suspended pending a decision by Operations personnel as to the justification for expending the funds estimated for the work (in the order of \$25,000). It is expected that the request for the project will be cancelled in favor of utilizing an available hood from another area.

ER-2794 - Maintenance and Equipment Storage Facility - 202-S Building

Project Preparation: 25% Scoping: 100% Prelim. Design: 75%

Total Authorized Funds: \$1,000

Work was commenced this period on the preparation of scope drawings for attachment to the proposal and estimating purposes.

It is tentatively planned that the proposal will be ready for interdepartmental approval signatures by August 15, 1956.

ER-2796 - Purchase Well Casing for Phase II, CA-688

Total Authorized Funds: \$5,200

A work order was received from the Commission to procure approximately 1500 feet of well casing to use on Phase II of Project CA-688, Additional Waste Disposal Facilities - BC Crib Area - Phase I. Advanced ordering of this pipe was deemed necessary in light of the current steel strike.

CA-546 - Fuel Element Pilot Plant

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Field Progress:			
F.P.	53.6%	100%	100%
M.C.	45.7%	100%	99%
P.F.	.7%	100%	99%
Total		100%	99%

Directive Completion Date: May 1, 1956*

Total Authorized Funds: \$1,600,000 - GE \$787,500 - AEC \$812,500

Total Estimated Cost: \$1,600,000

Minor Construction has completed all installation work. Tests have been made on all facilities. A list of exceptions has been prepared which constitutes final remaining work for Minor Construction.

F. H. Lohse, contractor, is cleaning up exceptions noted on initial inspection of second floor offices made July 10, 1956. Final tests on ventilation system are scheduled for week of July 23, 1956.

A list of start-up items has been prepared and submitted to General Electric Plant Forces for cost estimate, and a work order is to be issued to General Electric Plant Forces for this work.

*A revision to the project proposal, requesting an extension of time to September 1, 1956, is being circulated for approvals.

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

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Detailed Design: By AE Contractor		100%	100%
Field Progress:			
F.P.	100%	70%	28%*

Directive Completion Date: October 30, 1956

Total Authorized Funds: \$44,000 - GE \$6,000 - AEC \$38,000

Total Estimated Cost: \$44,000

The fly ash collector has been delivered to the job site. Supporting structural steel was scheduled for delivery July 25, 1956. Field work is to start after steel delivery.

*Percentage is estimated amount.

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HW-44580 DEL

CA-601 - General Ground Improvements - 300 Area

	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:	100%	100%
Directive Completion Date: December 1, 1956		
Total Authorized Funds:	\$60,000 - GE \$5,000 - AEC \$55,000	
Total Estimated Cost:	\$60,000	

The award of the fixed-price contract is delayed until FY 1957 funds are available. L. W. Vail Company submitted the low bid of \$48,225.

CG-614 - Hanford 4X Program - 300 Area

Average Manpower:	Approx. Accumulated Manpower: (man-days)
F.P.	F.P. 200
P.F.	P.F. 895

Directive Completion Date: July 1, 1956
 Total Authorized Funds: \$340,000
 Total Estimated Cost: \$340,000

A preliminary inspection for final acceptance was held July 20, 1956. Exceptions were primarily clean-up items.

The physical completion notice, with exceptions, is being prepared.

CA-615 - Mechanical Maintenance Shop Centralization - 100 Areas

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:		100%	100%
Field Progress:			
F.P.	54%*	N.S.*	10%
M.C.	10%**	15%**	28%
P.F.	36%**	47%**	47%
Total			25.1%

Average Manpower:	Approx. Accumulated Manpower: (man-days)
F.P. 4	F.P. 52
M.C. 3	M.C. 45
P.F. 1	P.F. 180

Directive Completion Date: February 28, 1957
 Total Authorized Funds: \$92,000 - GE \$42,000 - AEC \$50,000
 Total Estimated Cost: \$92,000

*Based on fixed price contract amount, work orders to Minor Construction and cost to complete estimate. A revised schedule will be prepared and submitted for approval.

CA-615 - Mechanical Maintenance Shop Centralization - 100 Areas (Continued)

**Based on approved schedule.

Construction by the fixed price contractor is proceeding. The building has been prepared for moving. Excavation for building foundation in 100-H is complete, and forms for concrete are being installed.

CG-618 - Replacement of Steam Line Support Poles

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Field Progress:			
M.C.	100%	36%	36%
Average Manpower:		Approx. Accumulated Manpower: (man-days)	
M.C. 8		M.C. 580	

Directive Completion Date: August 31, 1956
 Total Authorized Funds: \$110,000
 Total Estimated Cost: \$110,000

Pole replacement is progressing in the 100-D Area, after resumption of work on July 9, 1956.

Project proposal revision #2, requesting an extension of time to November 15, 1956, is being routed for the necessary approval signatures.

CG-620 - Melt Plant Modifications - 314 Building

	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:	33%	31%
Directive Completion Date:	May 31, 1957	
Total Authorized Funds:	\$143,000	
Total Estimated Cost:	\$143,000	

The three vendor quotations are being reviewed by the General Electric Company. Clarification of their bid is to be submitted by Consolidated Vacuum Corporation.

CG-630 - Alterations to Minor Construction Fabrication Shops

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:		100%	100%
Field Progress:			
F.P.	15%	100%	2%
M.C.	85%	78%	76%
Total		81%	65%

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HW 44580

DEL

CG-630 - Alterations to Minor Construction Fabrication Shops (Continued)

Average Manpower:	Approx. Accumulated Manpower: (man-days)
F.P. 2	F.P. 12
M.C. 3	M.C. 700

Directive Completion Date: October 15, 1956
 Total Authorized Funds: \$93,000
 Total Estimated Cost: \$93,000

The fixed price contractor started excavation July 19, 1956, on the service station addition. A revised project proposal is being circulated for approval requesting a change in scope and an extension of the completion date to December 15, 1956.

CA-633 - Remodeling of Facilities - Kadlec Hospital

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:		100%	100%
Field Progress:			
F.P. (Electrical)	100%	N.S.	10%

Directive Completion Date: April 1, 1957
 Total Authorized Funds: \$90,000; GE \$3,210; AEC \$86,790
 Total Estimated Cost: \$90,000

Electrical work was started and is approximately 10% complete. The contractor is Electric Smith Inc., Spokane, Washington.

For the sprinkler system contract the notice to proceed was issued to National Automatic Sprinkler Company, Portland, Oregon. Design, which is to be by the contractor, must be approved by the National Board of Fire Underwriters before submission to HAPO.

CA-639 - Painting Water Plant Structures - 100-DR

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:		100%	100%
Field Progress:			
F.P.	100%	45%	40%

Average Manpower:	Approx. Accumulated Manpower: (man-days)
F.P. 10	F.P. 260

Directive Completion Date: August 31, 1956
 Total Authorized Funds: \$75,000 - GE \$8,500 - AEC \$66,500
 Total Estimated Cost: \$75,000

CA-639 - Painting Water Plant Structures - 100-DR (Continued)

The contractor is making good progress and doing good quality work; however, he is still slightly behind his own schedule. The Atomic Energy Commission has not yet revised the project proposal requesting an extension of time to October 15, 1956.

CA-641 - Street Extensions - Hains, Gailard, Harris

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:		100%	100%
Field Progress:			
F.P.	100%	N.S.*	6%*

Directive Completion Date: August 1, 1956
 Total Authorized Funds: \$36,000; GE \$5,700; AEC \$30,300
 Total Estimated Cost: \$36,000

The contract, AT(45-1)-1131, was awarded to L. W. Vail Company. Grade staking was completed on all three streets. Construction on Gailard was started July 16, 1956. Storm sewer pipe is being laid by Cascade Engineering Company.
 *Estimated - No schedule as of this report.

CG-646 - Modifications to Pickling Machines - 313 Building

Project Preparation: 100% Scoping: 100%

Directive Completion Date: January 1, 1957
 Total Authorized Funds: \$55,000
 Total Estimated Cost: \$55,000

Preliminary and detailed design are the responsibility of the Design Section.

The vendor's corrected shop drawings were mailed July 15, 1956. The piping and installation drawing has been issued to Plant Forces for their use in procuring the necessary materials.

CA-649 - FY 1956 Water Tank Replacement

	<u>Actual</u>
Detailed Design: (G.E. Portion)	100%
Directive Completion Date: February 28, 1957	
Total Authorized Funds: \$58,500; GE \$12,000; AEC \$46,500	
Total Estimated Cost: \$58,500	

The notice of award issued to W. E. Caldwell, Louisville, Kentucky, on July 11, 1956. Their bid was \$40,814 for design, fabrication, and installation of the new tank.

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CA-650 - Replacement, Repair and/or Removal of Valve Houses - 100-B, D & F

	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:	100%	100%
Directive Completion Date:	December 31, 1956	
Total Authorized Funds:	\$65,000 - GE \$3,500 - AEC \$61,500	
Total Estimated Cost:	\$65,000	

Bid opening was held on July 23, 1956. Of the four bids, the apparent low bid of \$32,714 was submitted by L. H. Hoffman Construction Company.

CA-652 - Water and Sewer Facilities - Wellsian Way

	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:	100%	100%
Directive Completion Date:	November 30, 1956	
Total Authorized Funds:	\$133,000 - GE \$12,000 - AEC \$121,000	
Total Estimated Cost:	\$133,000	

The contract, AT(45-1)-1141, was awarded to Cascade Engineering Company in the amount of \$110,044. The notice-to proceed was sent July 23, 1956.

CA-658 - Shielded Personnel Monitoring Station - 747 Building Addition

Project Preparation: 100%

Total Authorized Funds: \$ 150
Total Estimated Cost: \$160,000

This project proposal has been rejected by AEC, Washington. No action has been requested by the Radiological Sciences Department.

CG-659 - Decontamination Facilities - 100-H, 200-W and 300 Areas

Total Authorized Funds: \$ 1,000
Total Estimated Cost: \$60,000

There has been no change in status of this project. Further action awaits instructions from the using department regarding the rejection by AEC.

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CG-660 - Modifications and Additions to Metallographic Cell- Radiometallurgy Bldg.

Project Preparation: 100% Scoping: 100%

	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:	N.S.	15%
Total Authorized Funds:	\$135,000	
Total Estimated Cost:	\$135,000	

A design schedule is being prepared by Design Section. Four orders have been placed for equipment totalling about \$15,000. Continuation of detail design and preparation of purchase requisitions was started on July 23, 1956, by Design Section.

CG-664 - 350° C Flow Loop - 314 Building

	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:	26%	45%
Directive Completion Date:	August 1, 1957	
Total Authorized Funds:	\$120,000	
Total Estimated Cost:	\$120,000	

The Design Section has issued 12 drawings for comment of which four have been re-issued for final approval.

CA-670 - Roof Repairs - Central Stores

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:		100%	100%
Field Progress:			
F.P.	100%	40%	38%
Directive Completion Date:	October 31, 1956		
Total Authorized Funds:	\$26,000 - GE \$2,800 - AEC \$23,200		
Total Estimated Cost:	\$26,000		

Construction work was started on July 13, 1956.

The status of various items of repair work is as follows:

1. Metal counter flashing on warehouse parapet walls has been secured and sealed.
2. The installation of sheet-metal caps on construction joints is progressing.
3. Repair of office area roof is progressing.
4. Recoating on warehouse roof and new roof over boiler room not yet started.

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CG-671 - Improved Calibration Facility - 3745 Building

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:		100%	100%
Field Progress:			
F.P.	100%	40%	40%
Average Manpower:			
F.P. 3			
Approx. Accumulated Manpower: (man-days)			
F.P. 60			

Directive Completion Date: March 1, 1957
Total Authorized Funds: \$22,500
Total Estimated Cost: \$22,500

Progress is continuing satisfactorily on the lump sum contract. Both wells have been drilled, and the concrete slab has been poured.

CG-673 - Replacement of Obsolete Radio-Communications Equipment

Project Preparation: 100% Scoping: 100%

Total Authorized Funds: \$ 1,000
Total Estimated Cost: \$181,000

No construction funds have been authorized for this approved project.

CG-676 - Fuel Element Pilot Plant - Semi-Works

Directive Completion Date: Not Established
Total Authorized Funds: \$120,000
Total Estimated Cost: \$400,000

Scoping, preliminary and detailed design are the responsibility of the Design Section.

Requisitions for critical materials are being issued.

CA-677 - Replacement of Thin-Wall Steel Water Lines FY 1956

	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:	100%	100%
Directive Completion Date: December 31, 1956		
Total Authorized Funds: \$29,000 - GE \$3,400 - AEC \$25,600		
Total Estimated Cost: \$29,000		

CA-677 - Replacement of Thin-Wall Steel Water Lines FY 1956 (Continued)

The contract, AT(45-1)-1141, was awarded to Cascade Engineering Company in the amount of \$18,700.

The notice to proceed has been sent to contractor July 23, 1956.

CG-680 - Corrosion Testing Facilities - 314 Building

Project Preparation: 100% Scoping: 100% Prelim. Design: 100%

Total Authorized Funds: \$ 1,900

Total Estimated Cost: \$171,000

The Hanford Operations Office requested AEC, Washington approval on June 12, 1956.

CA-685 - Alterations to Buildings 325 and 326 (ER-3133)

Project Preparation: 100% Scoping: 100%

Total Authorized Funds: \$ 2,000

Total Estimated Cost: \$23,000

This proposal was reviewed by the Commission's approval board on July 19, 1956, and the proposal was tabled until FY 1957 funds become available.

CA-690 - Roof Repairs - 190-D, F and 186-D Buildings

	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:	100%	100%
Total Authorized Funds:	\$ 1,400	
Total Estimated Cost:	\$28,000	

This project has been approved by AEC, and the bid package was scheduled for issue on July 31, 1956.

IR-200 - Graphite Machining Facilities - 300 Area

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:			100%
Field Progress:			
F.P.	99%	100%	95%
P.F.	1%	100%	75%
Total			95%

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IR-200 - Graphite Machining Facilities - 300 Area (Continued)

Average Manpower:

F.P. 5
P.F. 1

Approx. Accumulated Manpower: (man-days)

F.P. 150
P.F. 10

Directive Completion Date: August 1, 1956

Total Authorized Funds: \$18,700 - GE \$4,850 - AEC \$13,850

Total Estimated Cost: \$18,700

The contractor, F. H. Lohse, is endeavoring to finish contract work prior to August 1, 1956. However, it is expected that installation of doors and hardware and touch-up painting will be the exceptions. The contractor's start-up work date was affected by the recent labor strike.

A work order was issued to Plant Forces to place relocated equipment in start-up condition. This work started July 25, 1956, and is expected to be completed on August 3, 1956.

IR-202 - Lighting Improvements - Central Stores - Building 1171

Directive Completion Date: November 1, 1956

Total Authorized Funds: \$17,000 - GE \$1,500 - AEC \$15,500

Total Estimated Cost: \$17,000

The contractor is still awaiting delivery of light fixtures. They are now scheduled for shipment the latter part of July.

IR-204 - Office Addition to 141-M Building

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:			100%
Field Progress:			
F.P.	100%	N.S.	4%

Average Manpower:

F.P. 2

Approx. Accumulated Manpower: (man-days)

F.P. 12

Directive Completion Date: December 1, 1956

Total Authorized Funds: \$15,000

Total Estimated Cost: \$15,000

The contractor has moved on the site, and started excavation for building foundation on July 23, 1956.

Job 0069 - Disposal Program - Streets (AEC-152-A)

Project Preparation: 100% Scoping: 100% Prelim. Design: 100%

Directive Completion Date: Not Established

Total Authorized Funds: \$12,500*

Total Estimated Cost: \$675,000**

Negotiations, with an architect-engineer, Graham Osborne, of Yakima, have been virtually completed for design work on this project. The start of design work is awaiting approval of FY 1957 funds.

*Reduced from the original authorization of \$60,000.

**The project proposal is expected to show \$692,500.

Job 0070 - Disposal Program - Water Meters

	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:	85%	75%
Total Authorized Funds: \$12,200 (GE Portion)		
Total Estimated Cost: Not Established		

Detail design is in progress on all phases of work, as follows:

1. 700 Area - Design was 50% complete and drafting has been started. Some repiping will be required to install meters in 3 locations. AEC has requested a study to include changes in existing piping in contract AT(45-1)-1141 as modification to this contract.
2. Commercial Facilities - All investigation work was nearly complete, and detail design is in progress. Lack of As-Built records of commercial facility construction is delaying progress.
3. Residential - Detail design is 80% complete, and work has started to assemble information for specification. All investigation work was complete.
4. Export Water Lines - Investigation work is in progress, and detail design will be started by July 23, 1956.

Job 0076 - Partition Installation - 306 Building

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:			100%
Field Progress:			
F.P.	100%	N.S.	100%

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Job 0076 - Partition Installation - 306 Building (Continued)

Directive Completion Date: August 1, 1956
Total Authorized Funds: \$5,000
Total Estimated Cost: \$5,000

Installation of partitions in second floor offices, 306 Building has been completed by the contractor, F. H. Lohse.

This work was made part of contract for installing second floor offices Project CA-546, Fuel Element Pilot Plant.

Job 0078 - Installation of Concrete Pad at 3730 Building

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Field Progress:			
F.P.	100%	N.S.	100%

Directive Completion Date: August 1, 1956
Total Authorized Funds: \$250
Total Estimated Cost: \$250

Installation of the 6' x 30' x 6" concrete pad at 3730 Building has been completed by the contractor, F. H. Lohse. This work was made part of contract for Graphite Machining Facilities - IR-200.

ER-3122 - Replacement of Deaerator - 384 Building

Total Authorized Funds: \$1,000

This project has been closed by request of Manufacturing Department.

ER-3134 - General Improvements - Central Stores and Transportation Areas

Scoping: 100%

Total Authorized Funds: \$ 1,800
Total Estimated Cost: \$14,000

This informal request is being circulated for General Electric approvals.

ER-3139 - Oil, Paint, and Solvent Storage Facility - 300 Area

Total Authorized Funds: \$ 750
Total Estimated Cost: \$16,000

The AEC has returned this informal request unapproved. Manufacturing Department will advise action to be taken.

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Fe-40

ER-3145 - Lunch and Locker Room Facilities - 100-B, D, F Areas

Project Preparation: 100% Scoping: 100% Prelim. Design: 100%

Total Authorized Funds: \$ 2,000

Total Estimated Cost: \$183,500

The project proposal is being routed for General Electric Company approvals.

ER-3152 - Laboratory Facilities for Radiochemical Analysis

Scoping: 50%

Total Authorized Funds: \$2,000

A review of this project is being conducted by the Project Financial Group to determine if it can be constructed on FY 1957 funds. The preliminary project estimate is \$150,000 for this laboratory which is to be housed in a building addition.

ER-3153 - Public Address Systems - 200 Areas

Project Preparation: 100% Scoping: 50%

Total Authorized Funds: \$ 2,000

Total Estimated Cost: \$48,500

The project proposal is being routed for approval signatures.

ER-3154 - Drilling & Developing of Geological and Hydrological Wells

Project Preparation: 100% Scoping: 100%

Total Authorized Funds: \$ 750

Total Estimated Cost: \$137,000

The project proposal is being routed for signatures within General Electric Company.

ER-3155 - Fire Protection Facilities - 1717-B, D, F, H and 1704-H Buildings

Scoping: 100%

Total Authorized Funds: \$ 2,000

Total Estimated Cost: \$64,000

The project proposal is being routed for approval signatures.

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ER-3157 - Repairs to Power House Chimneys in 100 Area

Total Authorized Funds: \$ 2,000
Total Estimated Cost: \$220,000

The project proposal is being routed for signatures within General Electric Company.

ER-3158 - Relocate Dormitories - 100-H Area

Project Preparation: 100% Scoping: 100% Prelim. Design: 100%

Total Authorized Funds: \$2,000

A study is being made to determine what part of the scope might be eliminated and still have a usable office building.

ER-3159 - Public Address Systems - 100-B, D, F and H Areas

Project Preparation: 100% Scoping: 50%

Total Authorized Funds: \$ 1,000
Total Estimated Cost: \$35,000

The project proposal is being routed for approval signatures.

ER-3165 - Construction Engineering Work on Community Project for Sewage Plant Road

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:		100%	100%
Field Progress:			
F.P.	100%	N.S.*	10%*

Total Authorized Funds: \$4,550 - GE \$350 - AEC \$4,200
Total Estimated Cost: \$4,550

Construction was started July 16, 1956. The storm sewer pipe is being laid by Cascade Engineering Company. Grade staking was completed.

*Estimated - No schedule as of this report.

ER-3167 - Solvent Storage Building - 1100 Area

Total Authorized Funds: \$750

The project proposal is being routed for signatures. The project cost is estimated at \$86,000.

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DECLASSIFIEDER-3168 - Cylinder Storage Dock - 1100 Area

Project Preparation: 85% Scoping: 90%

Total Authorized Funds: \$ 750

Total Estimated Cost: \$52,000

The project proposal is being routed for signatures within the General Electric Company.

ER-3169 - Aquatic Biology Storage BuildingActual

Detailed Design:

100%

Total Authorized Funds: Not authorized for construction.

Total Estimated Cost: \$5,000

The design is complete. When construction funds are available, the using department will issue a work order for \$5,000 to cover the cost of the building.

ER-4001 - Foremen Information Lectures (Manufacturing Department)

Total Authorized Funds: \$616

Total Estimated Cost: \$616

Twenty of the twenty-two lectures have been delivered.

AEC-115 - Additional Richland Water Supply

	<u>Scheduled</u>	<u>Actual</u>
Detailed Design:	A 100%	A 100%
	B 100%	B 100%
	C 20%	C 20%
	D 100%	D 100%

Directive Completion Date: April 30, 1957

Total Authorized Funds: \$1,700,000 - GE \$29,300 - AEC \$1,670,700

Total Estimated Cost: \$1,700,000

Following is the current status of major portions:

A. ER-A-3160 Irrigation System

a. Yakima Pump Station - Plans and specifications to AEC.

b. Conversion of Irrigation System Plans and rough draft of specifications completed.

AEC-115 - Additional Richland Water Supply (Continued)

- B. ER-A-3161 Additional Hose Bids
Plans and specifications completed, ready to be included with water meter contract.
- C. ER-A-3162 Abandon Irrigation Canal
Investigation and assembling of reference material in progress.
- D. ER-A-3162 Storm Sewers
Plans and specifications to AEC for comment.

AEC-153 - Suburban Land Survey

	<u>Weighted</u>	<u>Scheduled</u>	<u>Actual</u>
Field Progress:			
P.F. \	100%	100%	91%
Average Manpower:	Approx. Accumulated Manpower: (man-days)		
P.F. 5		P.F. 64	
Directive Completion Date: June 30, 1956*			
Total Authorized Funds:	\$25,000 - GE \$18,000 - AEC \$7,000		
Total Estimated Cost:	\$25,000		

Request for extension of time to September 1, 1956, has been approved.

*Work was deferred to other work having higher priority.

III. REPORT OF VISITORS

A. To Hanford, July 1956

Frank Robinson of General Electric, Pasco, Washington, visited July 17 for consultation on a constant voltage supply.

R. F. Doupe, also of General Electric, Pasco, Washington, visited July 30 to check out ACA motors.

Bob Hanshe of Westinghouse Electric Corporation, Portland, Oregon, visited July 30 and 31 to work on Westinghouse canned pumps.

B. To Other Installations, July 1956

M. G. Patrick visited the Army Reactor Branch of the AEC in Washington, D. C., July 16 for consultation on the recirculating gas loop.

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ADVANCE ENGINEERING SECTION

July 1956

A report has been prepared on the four reactor types proposed for consideration as plutonium fuel cycle demonstration reactors. The report concludes that the graphite and heavy water moderated reactors are more satisfactory for this purpose than light water moderation. Further selection among the types must be made on grounds beyond the scope of the report.

An information meeting on the subject of organic cooling of reactors was held as a result of the trip reported last month in which a member of Advance Engineering participated.

Orderly progress continues in the studies on mathematical formulation of graphite reactor design and cost relationships and on long term reactivity and isotope changes.

Paul F. Gast

for
Manager, Advance Engineering
ENGINEERING DEPARTMENT

FW Albaugh:PFG:pk

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EMPLOYEE AND PUBLIC RELATIONS DEPARTMENT

MONTHLY SUMMARY - JULY 1956

PERSONNEL PRACTICES SECTION

The number of applicants interviewed in July was 985 as compared to 1058 for June. In addition, 30 new applicants applied by mail. Open, nonexempt, nontechnical requisitions increased from 76 at the beginning of the month to 99 at month end. One hundred and thirty-three employees were added to the roll and 94 removed during the month. The separation rate for fiscal month of July was .84% and for fiscal month of June 1.54%. These rates when converted to annual rates are 10.95% and 16.06% respectively. During July 64 new requests for transfer to other type work were received by Employment and 53 transfers were effected. Attendance recognition awards were distributed to 100 employees in July, including eight who qualified for six-year awards.

There were four employee deaths during the month of July. One hundred and seventeen visits were made to employees confined to Kadlec Hospital, and 19 checks were delivered to employees confined at the hospital or at home. At month end participation in the Pension Plan was 99.0%, in the Insurance Plan 99.6%, and the Employee Savings and Stock Bonus Plan 54.4%. At month end there were 693 nonveterans registered under Selective Service and 764 military reservists were on the roll. Since August 1, 1950, 443 employees have terminated to enter military service, of which 198 have returned, 67 have not claimed re-employment rights, leaving 178 still in military leave status.

One hundred and three adopted suggestions were approved for awards in July resulting in cash awards totaling \$2035 with a total net savings of \$12,588.71. Since the beginning of the 1955-56 season, 298 offers have been extended to BS/MS graduates for the Personnel Development Program. There have been 103 acceptances to date. Acceptances have been received from 76 experienced candidates. To date 660 PhD cases have been considered, 276 have been invited to visit and 145 have accepted invitations to visit.

EMPLOYEE COMMUNICATIONS AND PUBLIC RELATIONS SECTION

During the month 35 releases were sent out. Among them was a release regarding two radiation incidents, and despite a delay in releasing the information, a bad press seems to have been avoided.

July was a very active month in the conduct of community relations. A physician's day was conducted to acquaint area physicians and hospital administrators with General Electric, Hanford and the health and insurance programs. Indications are the venture was successful.

HANDS ACROSS THE ATOM, a HAPO produced film, made its debut on a regional telecast. Five films were produced and distributed in the public health series, HERE'S TO YOUR HEALTH. Plans are underway for a Fall series on Health, a TV version of the INSIDE HANFORD program and the entry of a Company float in the Atomic Frontier Days' celebration.

Employee Communications and Public Relations (Continued)

Preparations and plans are going forward for the providing of communication assistance for the forthcoming business review in September and the presentation of a communication workshop for all interested members of Hanford management.

A communication program related to HAPO reorganization was approved and steps taken to implement the program for both employees and the public commencing on August 3 and extending through the first week of September. An unusual feature of the program was the production of a news type film for TV release.

A total of 344 plates in graphics was completed during the month and a new expedient devised for the preparation of visual aids.

The 300 Area Photo Laboratory acquired some much needed additional space.

To reduce photographic costs, new equipment is being purchased, the use of which should result in lowered customer costs. In all a total of 295 photographic assignments were covered in July.

UNION RELATIONS SECTION

At the project construction dispute hearing in Spokane on June 18 regarding the Teamsters, Operating Engineers, and Cement Masons, the Ching Panel recommended that isolation pay of \$2.625 per day be continued at Hanford in lieu of the travel pay provisions contained in the current agreement and that bus transportation also be continued for the duration of the agreement.

No date has been set for the arbitration of the issue involving the one-day disciplinary layoff of two mechanics in Transportation. Legal is presently reviewing the case together with two other cases the Council requests be presented to the arbitrator at the same time - one involving call-in and the other, a new 200-W Laundry shift schedule.

By letter of August 3, the Company was informed by the HAMTC that they will withdraw their objection to the signing of patent agreements. The letter has been referred to Legal for comments.

A meeting was held on July 19 with the AEC to discuss the exterior painting work on Richland houses. It was agreed that all available Community painters in lack-of-work status would be recalled to perform as much of the painting as possible. This information was relayed to the HAMTC.

A meeting was held on July 16 with the HAMTC who questioned the contract being let by the AEC to reroof approximately 36 Richland houses on the basis that it could be accomplished by project forces presently in lack-of-work status. The Council terminated the discussion with the comment that they wished to consider the Company's position further.

The cost-of-living increase which resulted from the rise in the Bureau of Labor Statistics' Index for June 1956 over the September 1955 index became effective July 30.

SALARY AND WAGE ADMINISTRATION SECTION

Section personnel expended considerable time during the month reconciling positions within the components of the proposed HAPO organization and in preparing data for reconciliation with other Company components.

Salary data on selected positions were exchanged with the National Lead Company. Salary data on selected positions were transmitted to Employee Compensation Services for submission in surveys being conducted by the Glen L. Martin Company and by the American Management Association.

A report on first-line supervisory differentials in Employee & Public Relations, Financial, Radiological Sciences and Engineering Departments was prepared and issued.

AEC concurrence with the application at HAPO of the revised Company-wide schedule of starting rates for Technical and Business Graduates, effective July 30, was received.

A cost-of-living adjustment in rates of non-exempt personnel became effective on July 30.

A listing of exempt personnel for the proposed organization was prepared and distributed to appropriate personnel. Work on a listing of non-exempt personnel is in progress.

Information on salary and wage records procedures was prepared and issued to those charged with such responsibilities under the new organization.

EDUCATION AND TRAINING SECTION

New graduates reporting during the summer have resulted in a present total of 100 on the Personnel Development Program's rotational-work-assignment activity. These people should prove an excellent source of manpower for filling anticipated openings within the next several months. An introductory program designed to acquaint these people with the Hanford organization was effectively conducted during the early part of this month.

Additions are being made to the Technician Training Program to start a new two-year, work study program to provide engineering aides two years hence. The first graduates of this program will be available in September, 1957.

HEALTH AND SAFETY SECTION

There was one disabling injury caused by a steel cable striking an employee.

Treatment was continued intermittently on two operations employees who accidentally inhaled some soluble plutonium June 18, 1956. Urinary excretions suggest that the body deposit not including that in the lungs is probably below the permissible amount in one case but exceeds the allowable limit by an estimated factor of three to ten in the other case. This is therefore the first unequivocal case of body deposit of long life radioactive material exceeding the allowable limit which has occurred at HAPO since start-up.

Health and Safety Section (Continued)

Plans for transfer of the hospital on September 9 to the Methodists are proceeding smoothly. Preferential rates will be used by the Methodists to maintain the present salary levels of hospital employees after transfer.

AUXILIARY OPERATIONS AND PLANT PROTECTION SECTION

There were nine HAPO fire alarm responses during the month including two minor grass fires and two false alarms. Losses were \$20. In addition, responses were made to one construction fire, one U. S. Army fire and one private auto fire. Loss in the construction fire was estimated at \$125 and approximately \$100 damage was reported for the private auto.

Personnel of the 700 Area participated in "Operation Alert - 1056" by reporting to their parking lots upon the evacuation signal. All employees except those engaged in essential operations cleared the area in five minutes. The first shutdown of the steam plant in accordance with evacuation plans was also carried out and results indicated that the procedure was practical and safe.

The telephone property valuation by R. W. Beck and Associates was completed and their reports received and transmitted to the AEC.

A contract for furnishing and installing a 51 pair cable between the White Bluffs exchange and the 100-H Area was awarded by the AEC to the Matoon Company of Oswego, Oregon.

Total unaccounted for documents remained the same at 192. Security violations decreased from 16 in June to 12 in July.

The selective reinvestigation program was continued during the month with approximately 45% of the questionnaires having been returned.

COMMUNITY SECTION

Business Developments:

	<u>June</u>	<u>July</u>
Supplemental agreements	0	1
Leases assigned or new sublease agreements	3	1
Lease and sublease terminations	5	1
Business opening	0	1
Church land sold	2	1

Richland received a traffic safety award this month from the International Association of Chiefs of Police. The award is a "Certificate of Achievement in Police Traffic Supervision in 1955". The award was made for cities competing in the 10,000 to 25,000 population group throughout the nation.

The street striping program was completed on June 29. This included approximately 43 miles of arterial center lines, 176 crosswalks, 3½ miles of yellow curbing, 35 street "Speed" stencils and 12 street stencils reading "Slow Down and Live".

PERSONNEL PRACTICES SECTION

July, 1956

A more attractive design has been agreed upon for the Service Award pin to be conferred to employees with 10 or more years of service and invitations to bid have been extended but were still open at month end.

The second quarter Employee Relations Indicator report was issued on July 27, 1956. Among the significant facts indicated by this report was that 99% of our people are participating in the Pension Plan which is the highest level of participation we have had since the Plan was initiated in 1946. There were only 86 eligible nonparticipants.

	<u>June, 1956</u>	<u>July, 1956</u>
Applicants interviewed	1,058	985

158 of the applicants interviewed during July were individuals who applied for employment with the Company for the first time. In addition, 30 applications were received through the mail.

	<u>June, 1956</u>	<u>July, 1956</u>
Open Requisitions		
Exempt	---	---
Nonexempt	76	99

Of the 76 open, nonexempt, nontechnical requisitions at the beginning of the month, 55 were covered by interim commitments. Of the 99 open, nonexempt, nontechnical requisitions at month end, 65 were covered by interim commitments. During July, 106 requisitions were received requesting the employment of 191 nonexempt, nontechnical employees.

	<u>June, 1956</u>	<u>July, 1956</u>
Employees added to the rolls	198	133
Employees removed from the rolls	<u>138</u>	<u>94</u>
NET GAIN OR LOSS	/ 60	/ 39

	<u>Fiscal Month</u> June, 1956		<u>Fiscal Month</u> July, 1956	
	<u>Male</u>	<u>Female</u>	<u>Male</u>	<u>Female</u>
Separations Rate:	1.10%	3.58%	.58%	2.02%

	<u>Fiscal Month June, 1956</u>	<u>Fiscal Month July, 1956</u>
Over-all Separations Rate	1.54%	.84%

During July, 17 employees left voluntarily to accept other employment, 2 left for business for self and 3 left to enter military service.

Transfer Data

Accumulative total of requests for transfer received since 1-1-56	435
Number of requests for transfer received during July	64
Number interviewed in July, including promotional transfers	59
Transfers effected in July, including promotional transfers	53
Transfers effected since 1-1-56, including promotional transfers	327
Number of stenographers transferred out of steno pool in July	15
Transfer requests active at month end	414

ADDITIONS TO THE ROLLS

	<u>Exempt</u>	<u>Nonexempt</u>	<u>Community Firemen</u>	<u>Total</u>
New Hires	12	89	--	101
Re-engaged	--	1	--	1
Reactivates	4	26	--	30
Transfers	--	1	--	1
Total Additions	16	117	--	133

TERMINATIONS FROM THE ROLLS

	<u>Exempt</u>	<u>Nonexempt</u>	<u>Community Firemen</u>	<u>Total</u>
Actual Terminations	6	55	--	61
Removal from rolls(deactivates)	2	26	--	28
Transfers	4	1	--	5
Total Terminations	12	82	--	94

GENERAL

	<u>6-1956</u>	<u>7-1956</u>
Photographs taken	417	246
Fingerprint impressions	137	131

PERSONNEL SECURITY QUESTIONNAIRES PROCESSED

	<u>6-1956</u>	<u>7-1956</u>
General Electric Cases	72	64
Facility Cases	9	23
Total	81	87

The validation study for the Secretarial Selection Program was completed, however, the results were not significant so that the test battery can be used with sufficient confidence as a selection aid. Twenty-two secretaries were tested, special rating forms obtained from their supervisors and the data was treated statically to see if any relationship existed between test scores and ratings.

The study of the Supervisory Selection Program should be completed in the next few weeks. An analysis of the data for tests, the over-all selection procedure and the opinion survey appeared highly favorable.

The Minor Construction Sub-Section advised that it wished to reduce its force by 36 nonexempt employees by July 13. Twelve employees indicated a willingness to accept employment with the J. A. Jones Company who will accept the responsibility for the function; four have already accepted layoff to accept employment with J. A. Jones and of the remaining employees all except four have been tentatively placed in other positions.

INVESTIGATIONS STATISTICS

	<u>6-1956</u>	<u>7-1956</u>
Cases received during the month	93	90
Cases closed	50	46
Cases found satisfactory for employment	102	66
Cases found unsatisfactory for employment	1	-
Cases closed before investigation completed	1	-
Special investigation conducted	1	2

Perfect Attendance Recognition Awards

Total one-year awards to date since January 1, 1950	5749
One-year awards made in July	37
Total two-year awards to date since January 1, 1950	3367
Two-year awards made in July	25
Total three-year awards to date	2052
Three-year awards made in July	18
Total four-year awards to date	1131
Four-year awards made in July	7
Total five-year awards to date	421
Five-year awards made in July	5
Total six-year awards to date	58
Six-year awards made in July	8

Service Recognition

Total Service Recognition Pins presented to date	6305
Five-year Service Recognition Pins presented during July to Exempt personnel	46
Five-year Service Recognition Pins presented during July to Nonexempt personnel	90
Fifteen-year Service Recognition Pins presented during July to Exempt personnel	1
Fifteen-year Service Recognition Pins presented during July to Nonexempt personnel	1

During July, 14 people whose continuity of service was broken while in an inactive status were so informed by letter.

The following contacts were made with employees during the month of July:

Employee contacts made at Kadlec Hospital	117
Salary checks delivered to employees at Kadlec Hospital	17
Salary checks delivered to employees at home	2

Nine employees retired during the month of July, namely:

John R. Cullen	W-6579-4641	Normal Retirement
Albert E. Eddy	W-9934-4632	" "
Mitchell K. Hawkins	W-4951-6604	" "
Joyce R. Kelley	M-12204-6700	" "
John Smith	W-6677-4641	" "
Ernest W. Stocker	W-4762-6166	" "
Posey L. Weiss	W-9196-6254	" "
Alfred J. Weyerts	W-7911-6372	" "
Nolan H. Smith	W-8711-4641	Optional Retirement

All matters pertinent to retirement have been discussed with these employees in order that they will be fully informed of their retirement benefits.

Four employees expired during this period, namely:

Wesley L. Manning, Sr.	7-12-56	W-9084	Manufacturing
George L. Knight	7-30-56	W-8389	Employee & Public Relations
Ernest W. Brien	7-29-56	W-17199	Manufacturing
Joseph A. England	6-23-56	W-7243	Retired

All necessary arrangements will be made to settle matters of business existing between the Company and beneficiaries of the deceased.

Since September 1, 1946, 197 life insurance claims have been paid totaling \$1,413,112.

A total of 105 new employees attended Orientation Programs given by members of this group during the month of July. (Three of these new employees were temporary and therefore were not eligible for insurance or pension.) Of this number, 100% have signed up to participate in the Pension Plan, 98% have signed up to participate in the Insurance Plan, and 92% have signed up to participate in the Good Neighbor Fund.

Thirty-five letters were written in regard to matters concerning deceased employees.

At the end of the month, participation in the Employee Benefit Plans was as follows as compared with last month's participation:

	<u>JUNE</u>	<u>JULY</u>
Pension Plan	99.0%	99.0%
Insurance Plan	99.6%	99.6%
Savings & Stock Bonus	54.6%	54.4%
Good Neighbor Fund	71.4%	71.2%

Total number of non-veteran employees subject to military service training through Selective Service System

693

Number Classified 1A	171
Number Classified 1A0	1
Number Classified 1D	64
Number Classified 2A	110
Number Classified 3A	236
Number Classified 4A	4
Number Classified 4F	92
Number Classified 2S	14
Number Classified 4D	1
	<u>693</u>

Number of Technically Trained & Engineering Personnel for whom deferments are currently being requested

132

Number of Non-Technically Trained & Engineering Personnel for whom deferments are being requested

6
138

Accumulated total of deferments requested

1693

Accumulated total of deferments granted

1354

Current number of deferment requests pending

48

Current number of deferment requests denied

2

Current number of deferment requests granted

12

During Month of July

Number of deferment requests pending at Local Board level

41

Number of deferment requests pending at Appeal Board level

6

Number of deferment requests pending at Presidential Appeal level

1
Total 48

Number of deferment requests denied by Local Boards

2

Number of deferment requests denied by State Appeal Boards

0

Number of deferment requests denied by Presidential Appeal Board

0
Total 2

Number of deferments granted by Local Boards

12

Number of deferments granted by State Appeal Boards

0

Number of deferments granted by Presidential Appeal Board

0
Total 12

Number of Technically Trained & Engineering Personnel, denied, or requesting no further appeal, now pending induction	0
Number of Technical Graduates with over two years of deferments	71
Number of Selective Service vulnerable Technical Graduates Enlisted	0
Number of Selective Service vulnerable Technical Graduates Drafted	0
Number of Technical Graduates called to active duty under R.O.T.C.	0
Reservists Data - Total Number of Reservists on Roll	
Number of Active Reservists	181
Number of Inactive Reservists	562
Number of employees in the National Guard	21
Total	<u>764</u>
Reservists and National Guard members subject to drills, tours of duty, Cruises, Summer Camp and/or Weekly or Monthly Meetings	272
Military Service Leaves of Absence - August 1, 1950 thru July 31, 1956	
Reservists	136
Selective Service System	298
Female Employees Enlisted	9
Total	<u>443</u>
Total number returned to roll	198
Reservists	86
Sel. Serv. Sys.	<u>112</u>
	<u>198</u>
Known number not claiming reemployment rights	67
Number of employees still on military leaves	178

Suggestion Plan

	<u>June</u>	<u>July</u>	<u>Total Since 7-15-47</u>
Suggestions Received	296	259	20434
Acknowledgments to Suggesters	295	278	
Suggestions Pending Acknowledgment	53	34	

Suggestions Referred to Departments for Investigation	339	340
Suggestions Pending Referral to Departments	65	51
Investigations Completed and Suggestions Closed	338	290
Suggestions Adopted - No Award (line of duty)	0	1
Adopted Suggestions Approved by Board for Award	185	103
Total Net Savings	\$12,301.24	\$12,588.71
Total Cash Awards	2,405.00	2,035.00
Total Number Suggestions Outstanding to Departments	591	583

Cumulative suggestion statistics for the first seven months of 1956, compared with the same period for 1955, are:

	<u>1955</u>	<u>1956</u>	<u>% Change</u>
Received	1,692	1,951	+15.3%
Adopted	652	637	- 2.3%
% Adopted	38.5%	32.7%	-15.1%
Awards	\$13,179	\$12,200	- 7.4%
Savings	\$98,957	\$73,578	-25.6%
Award/Savings	13.3%	16.6%	+24.8%

Life Insurance

Sixty-six requests for code information were received from insurance companies and investigation agencies and furnished during the month of July, 1956. The code information is supplied in accordance with a prearranged plan whereby employees of this project may be insured on the same basis of those working elsewhere.

Insurance Statistics

Claims reported to Department of Labor and Industries

<u>June, 1956</u>	
<u>Long Forms</u>	<u>Short Forms</u>
20	322

<u>July, 1956</u>	
<u>Long Forms</u>	<u>Short Forms</u>
39	351

Total since September, 1946 - 33,484

Claims reported to Travelers

<u>June, 1956</u>	<u>July, 1956</u>
5	6*

*Of the claims reported to Travelers Insurance Company during the month of July, all were property damage.

Operations - Workmen's Compensation Claims

- a. Fletcher F. Collins - Claim No. 8001370 - Date of Injury: 12-5-52; Employer: General Electric Company; Nature of Injury: Ruptured Intervertebral Disk.

Mr. Collins, formerly a track foreman in the Transportation Section, appealed to the Board of Industrial Insurance Appeals from a rejection of his claim for a back injury of December 5, 1952. The Board sustained the rejection on the basis that Mr. Collins had failed to establish that he had sustained an injury in the course of his employment. Mr. Collins then appealed to the Superior Court for Benton County and the case was heard before a jury on July 2, 1956. The jury held in favor of the defendant and found that Mr. Collins had not sustained an injury in the course of his employment. The Superior Court trial, in all probability, will conclude the litigation with respect to the injury of December 5, 1952. Mr. Collins, however, has two other claims for back injuries, possibly related to the injury of December 5, 1952, now pending before the Board. The two cases have been in suspense pending the outcome of the case tried in Benton County and it is expected that they will be set for hearing before the Board.

- b. Rolland Gilbert - Claim No. 8001424 - Date of Injury: 5-8-53; Employer: General Electric Company; Nature of Injury: Contusion of knees and hands--strain of back.

Mr. Gilbert, formerly employed by General Electric as a metal handler in the Metal Preparation Section, appealed to the Board of Industrial Appeals from a denial of his application to reopen his claim on the basis of aggravation. A conference was held before the Board in Tacoma on July 2, 1956, where it was agreed to send Mr. Gilbert out for another medical examination. A later conference will, no doubt, be scheduled after receipt of the doctors' findings.

Construction

- a. Dixie A. Kirkland - Claim No. 9000288 - Date of Injury: 1-13-44; Employer: du Pont; Nature of Injury: Multiple Injuries to the Back and left side.

Mr. Kirkland appealed to the Board of Industrial Insurance Appeals after his request for a reopening of his case was denied. During the preparation of the case it was learned that Mr. Kirkland had filed claims for the same condition for which he was contending disability with various insurance companies and also under the Longshoremen and Harbor Workers Act. Motion pictures were also taken of him lifting, bending, and using his arms. During hearings before the Board, the claimant admitted filing the other claims, and the motion pictures provided clear evidence that his back condition was not as he had alleged. On July 18, 1956, the Board issued its "Decision and Order" sustaining the denial of Mr. Kirkland's application to reopen his claim.

William E. Taylor - Claim No. 9007629 - Date of Injury: Indefinite;
Employer: V. S. Jenkins; Nature of Injury: Alleged Asbestosis.

Mrs. Taylor applied for a widow's pension following the death of her husband. Mr. Taylor, during his lifetime, had filed a claim with the Department of Labor and Industries for a condition described by him as "a gradual decrease in lung power." After allowance of the widow's application for a pension, General Electric appealed to the Board on the basis that Mr. Taylor's employment at Hanford was not responsible for his death and, even if it were shown that the death resulted from exposure to asbestos and that his employment at Hanford contributed to his condition, the cost of the widow's pension should be apportioned among several employers and not charged entirely to the Hanford employer. A hearing on the case was held in Richland on July 30, 1956. Four lay witnesses were presented on behalf of the widow and the matter was continued to Portland for further testimony on her behalf.

Liability Insurance

Curtis Swearingen vs. General Electric Company - Claim No. B-6835841.
Milo Riste vs. General Electric Company - Claim No. B-6835809.

The Swearingen case was tried before a jury in the Franklin County Superior Court resulting in a verdict in favor of the plaintiff of \$12,769.61. A Motion for Judgment NOV (notwithstanding the verdict) was argued before Judge Horrigan on July 10, 1956. The Motion was denied and consideration is being given to an appeal to the Supreme Court.

Mr. Riste's attorneys have advised that they are not at all receptive to a settlement of the Riste case and are anxious to try the case.

General

On July 24, 1956, a meeting was held in Olympia between representatives of the Department of Labor and Industries, the Atomic Energy Commission and the General Electric Company for the purpose of discussing an amended contract between the three parties with respect to Workmen's Compensation. The meeting was the result primarily of the acknowledged need to provide for payment of administrative expenses incurred by the Department in handling General Electric claims. A draft of the proposed amended contract was submitted to the Department for consideration, and it is expected that signatures on the completed amended contract will be obtained in the near future.

BS/MS Personnel Development Program

Major efforts during the month were spent in preparation for the 1956-57 recruiting season. The dates for all of the coordinated visits have now been established.

A report on the BS/MS campus recruiting outlook for the next year was written and issued during the month emphasizing the extreme degree of competition that we may expect.

The groundwork has been layed for a meeting in San Francisco on September 17 and 18. The meeting is designed to acquaint all Region VI recruiters with each other as well as to familiarize them with the various training programs offered by General Electric. A one and one-half hour Hanford presentation has been planned for the meeting.

During the reporting period two offers were made, one acceptance and one rejection were received and twenty-two candidates reported on the roll.

The following table summarizes the status of the Program by fields:

<u>Field</u>	<u>Offers Extended</u>			<u>Acceptances</u>			<u>Open Offers</u>			<u>Rejections</u>			<u>On The Roll</u>
	<u>BS</u>	<u>MS</u>	<u>Total*</u>	<u>BS</u>	<u>MS</u>	<u>Total*</u>	<u>BS</u>	<u>MS</u>	<u>Total*</u>	<u>BS</u>	<u>MS</u>	<u>Total</u>	
<u>Engineering</u>													
Chemical	78	5	83	26	1	27	2	1	3	50	3	53	24
Electrical	36		36	12		12				24		24	12
Mechanical	69	2	71	18		18				51	2	53	18
Metallurg.	10	1	11	3		3	1		1	6	1	7	3
<u>Science</u>													
Chemistry	24	5	29	13	3	16				11	2	13	14
Physics	36	5	41	12	2	14	1		1	23	3	26	13
<u>Other</u>	<u>25</u>	<u>2</u>	<u>27</u>	<u>12</u>	<u>1</u>	<u>13</u>	<u>1</u>	<u>-</u>	<u>1</u>	<u>12</u>	<u>1</u>	<u>13</u>	<u>10</u>
TOTALS	278	20	298	96	7	103	5	1	6	177	12	189	94

BS/MS Experienced Recruiting

There were a total of 65 cases considered during the month of July with 11 invitations to visit being made and 9 experienced candidates visiting the Hanford Operation. Seventeen employment offers have been extended this month with 8 offers accepted and 14 people placed on the roll.

A representative from Hanford met with the firm of Deutsch & Shea in New York City to initiate a new advertising program tailored to fit the current needs of the Hanford Operation.

The majority of the new cases considered were responses to advertisements in technical journals and it has been observed that the candidates replying to this type of advertisement appear to be more technically competent than the average response to newspaper advertising.

The following table summarizes the status of the Program by fields.

Field	INVITATIONS					OFFERS			On the Roll
	Cases Consid.	Ext.	Visited	To Visit	Open Invitations	Ext#	Acc.*	Open*	
<u>Engineering;</u>									
Chemical	127	23	19			19	14	1	13
Electrical	93	23	19			20	9	1	6
Mechanical	218	45	30	1	6	29	14	2	13
Industrial	52	6	4	1		4	4		4
Metallurg.	57	10	6		1	5	4		4
Civil	32	4	3			4	4		4
Geological	9	2	2			3	3		3
<u>Science:</u>									
Chemistry	148	15	11		1	20	13		12
Physics	96	25	11		4	8	3	1	3
Math-Stat.	117	14	9			9	5	2	5
<u>Other:</u>	<u>626</u>	<u>22</u>	<u>18</u>	<u>-</u>	<u>1</u>	<u>36</u>	<u>23</u>	<u>1</u>	<u>19</u>
TOTALS:	1,575	189	132	2	13	157	96	8	86

*Offer total includes 24 carry-overs from the 1954-55 season of which 20 were acceptances not on the roll as of 9/1/55, and 4 were open offers at that time.

PhD Recruiting

The following table compares the current season's results to date with those at the same point last year:

	<u>7/31/56</u>			<u>7/31/55</u>		
	<u>New</u>	<u>Exper.</u>	<u>Total</u>	<u>New</u>	<u>Exper.</u>	<u>Total</u>
Candidates	558	102	660	524	61	585
Invited	250	26	276	202	16	218
Accepted	130	15	145	113	12	125
Visited	111	12	123	94	7	101
Offered	44	3	47	36	6	42
Accepted	9	0	9	15	5	20
On the roll	11	0	11	7	5	12

Activity during the month may be tabulated as follows:

	<u>New Appl.</u>	<u>Invited</u>	<u>Accepted</u>	<u>Visited</u>	<u>Offered</u>	<u>Accepted</u>
New PhD's	6	16	10	9	6	1
Expr.	7	5	4	1	0	0
Total	13	21	14	10	6	1

There are currently 10 open visit invitations, and 8 open offers; 35 candidates have accepted visit invitations but have not yet scheduled their interviews.

The following table covers both experienced and New PhD's and illustrates the increased difficulty of putting candidates on the rolls this year compared with the previous year.

	<u>9/1/55 - 7/31/56</u>	<u>54-55 Full Season</u>
Percent invitations accepted	52.5	57.0
Percent of visitors offered	38.2	44.7
Percent of offers accepted	19.2	41.2

The current reduction in the proposition of visitors offered is particularly due to a smaller proportion of visitors showing an interest in Hanford in relation to other General Electric components visited.

Transfers and Terminations

During the month of July, 1956 13 technical employees terminated employment at Hanford. Five of this number left for other jobs, three to enter military service, one employee retired and 4 transferred to other GE components. Three of the four transfers were to San Jose and one to Ft. Wayne, Indiana.

During July, 24 new requests for transfers were received and are now being handled by this unit. This figure is in addition to active cases being processed that originated earlier in the year. The total active cases at this time is 101.

Fourteen cases were made inactive during July. Four of these represent employees who were transferred to other General Electric components, six are remaining at Hanford either in a new assignment or their present one and three terminated for other employment. The other three terminations for other employment were employees who did not contact this office prior to their resignation.

EMPLOYEE COMMUNICATIONS AND PUBLIC RELATIONS

In accordance with the objective to provide more information within the Northwest, releases to regional media have doubled to date over last year's figures. The number of national releases submitted so far is approximately half of last year's; however, indications are that the number actually placed may exceed last year's. Material concerning Hanford still continues to provide the majority of national publicity about the Atomic Products Division.

During the past month 35 releases were sent out. Eight were concerned with technology and research; six with employee services; five with employee benefits and pay; four with Richland; four were part of the Hanford atomic science series; two with plant services; and one each dealt with administration and legal, utilities and public works, transportation, real estate, safety and Richland and Hanford protection.

In July information was released regarding two radiation incidents at Hanford, one of which happened a year and one-half ago. Although this was the first incident at Hanford which exceeded the national permissible limit, and the recent one may be the second, and despite the delay in releasing information, a bad press has been thus far minimized.

Hanford press relations activities have been reviewed again following the receipt of the GUIDE FOR MEASURING PRESS RELATIONS WORK published by the Company in the East. In addition, the press relations mailing lists were surveyed during the month and names and addresses brought up to date.

This has been a very active month in the conduct of community relations. On July 25 Hanford entertained area doctors and hospital administrators. The tours of Transportation and the Industrial Medical facilities were lightly attended, but 18 physicians and hospital administrators and three representatives of the AEC attended the cocktail hour and dinner. The dinner featured as speakers L. L. German, Dr. W. D. Norwood, and W. P. Allen. Early indications are that the affair helped to accomplish the objective of fostering good relationships between this group and the Company. A similar function for next year is planned, and attendance should be better then.

HANDS ACROSS THE ATOM, a Hanford produced film featuring the slave manipulator, made its debut on a regional telecast this month. In connection with the debut, a live program featuring the cutting of a birthday cake with the slave manipulator and brief talks by Hanford personnel also were telecast. The program served not only to introduce the film but to commemorate the third anniversary of the laboratories as well. The anniversary cake was baked in the form of an enlarged uranium slug.

The first five films being produced for Public Health, and which will be aired by regional TV stations as a public service, were produced and delivered. Radio spot announcements on the same subjects as included in the films were recorded and distributed to regional radio stations. The material is available also for use in employee groups. A fall series of ten films on health precautions in the HERE'S TO YOUR HEALTH series is contemplated for release to the same media.

Format for a television program on INSIDE HANFORD for fall showing is being developed.

EMPLOYEE COMMUNICATIONS AND PUBLIC RELATIONS

Members of the GENERAL ELECTRIC HANFORD SCIENCE FORUM went to McNary City on July 18 to present a live version of the popular TV show.

A total of 428 copies of a speech, THE HANFORD ADVENTURE, offered to employees through the Management NEWS Bulletin and the GE NEWS have been distributed. Employees are planning to give the speech when they visit their home towns on vacation. The response of employees to participate in this fashion in the public relations program is very encouraging.

Plans for the future include placement of a story in LIFE magazine featuring Hanford's use of water in the atomic energy program and the entry of a Company float in the Atomic Frontier Days' parade on August 4.

Work has begun on the accumulation of items and photographs indicative of the technological progress made at Hanford during 1956. This information will be submitted for inclusion in the January issue of the GENERAL ELECTRIC REVIEW which is a round-up of technical progress throughout the Company.

During the month all required approvals were obtained for seven technical papers and articles for publication. One technical paper was presented during the month, two public speeches were presented and four articles for publication were sent to editors for placement.

Preparations and plans are going forward for the providing of communication assistance for the forthcoming business review in September. During the past month a color study was conducted to determine the most satisfactory variation to use in the production of slides for the review.

A communication program related to HAPO reorganization was approved and steps taken to implement the program. First announcement will be published in the GE NEWS on August 3, and the communication program will be continued through the first week of September. Both a public and an employee communication program will be used to explain the reorganization. In addition to using the press and GE NEWS to carry the story, a special TV film introducing Mr. Johnson and his staff has been prepared for release throughout the region. This is the first instance in which such a medium has been employed for dissemination of Company news of importance.

A report on the program to increase effectiveness of round table meetings has been prepared and will be presented to Employee Relations Managers of the decentralized HAPO organization early in August. The program consists of information for use of supervisors at these meetings and a report-back system which is designed to establish a formal channel of upward communication.

To evaluate the effectiveness of one periodic publication, the MONTHLY HEALTH BULLETIN, a readership survey is in progress. Early returns indicate the publication is effective and successful both as to style and topic selection.

Material on the recent Suggestion Plan promotion in connection with the 50th anniversary of the Plan has been compiled and submitted in the Company-wide promotional awards competition.

EMPLOYEE COMMUNICATIONS AND PUBLIC RELATIONS

Plans are being implemented for the conduct of a communication workshop for all interested members of Hanford management sometime in the Fall.

Four publications for customer components were completed during the month, and five were in production. In addition four issues of the Management NEWS Bulletin were distributed.

GE NEWS material designed to supply information to employees about their jobs and thus increase job satisfaction included a full page feature about Hanford secretaries.

Safety was featured in every issue of the GE NEWS and a new proposal prepared for the production of the motion picture on safety, THE CLOSED DOOR.

Six slidefilms on mental health and human relations have been approved for production. Work is progressing on the art work for the first of these presentations. The films will be used for the training of Hanford supervisory personnel as part of the Understanding People program.

During the month improvements in the technical side of the communication business were noted. A new expedient for the preparation of visual aids was devised. Drawings were prepared on transparent vellum and rendered in heavy pencil, making possible reproduction using the inexpensive Ozlid process.

The following is a tabulation of graphics assignments for the month of July:

<u>Distribution of Graphics July Assignments</u>		<u>Percent</u>	
General Administrative (Including Operations Research)		--	
Employee and Public Relations		19	
Engineering		43	
Manufacturing		14	
Financial		10	
Radiological Sciences		14	
Atomic Energy Commission		--	
		<u>June</u>	<u>July</u>
Total assignments completed		37	49
Total assignments backlog		16	24
		<u>Graphs or</u>	<u>Illustrations</u>
		<u>Charts</u>	<u>Other</u>
Report Material (Includes Technical Publications)	63	1	10
Technical or Scientific Illustrations	17	18	3
Mechanical Art (Flow charts, schematics, maps, etc. - not for publication)	22	--	21
Lecture Material (Includes plates for slides)	34	17	--
Posters	--	4	--
General (Posting of current data, assembly, revisions, etc.)	70	--	64
	206	40	98

EMPLOYEE COMMUNICATIONS AND PUBLIC RELATIONS

A total of 84 charts and graphs were prepared for technical reports; 14 slides were completed for meetings to be held off-site and 52 charts on regular open orders were posted during the month.

A perspective and a side elevation cut-a-way view is being developed of a proposed low level dam pumping station. This is part of the design program for a power reactor recently announced as being undertaken by General Electric at Hanford at the request of the AEC.

To reduce photographic costs, including materials and overtime, new equipment is being purchased. Use of this equipment should lead ultimately to lowered customer costs as well as lower operation's costs. Customer demand for, and satisfaction with, photographic service remains at a high level which has necessitated more overtime than originally forecast; however, it is hoped to end the quarter within budget limitations.

Needed additional space has been acquired for the 300 Area photo lab following decontamination of a room adjoining the present facilities.

July was a month of large photographic orders. A total of 295 photographic assignments were covered, 1,113 negatives exposed and 17,795 prints produced. Preparation of photographs for technical reports and the completion of portraits of managers for use in the forthcoming reorganization announcements made up part of the month's activities. A complete analysis of photographic assignments is included on the attached breakdown.

PHOTOGRAPHY UNIT MONTHLY REPORT	I. D.	2" X 3"	4" X 5"	5" X 7"	8" X 10"	8 1/2" X 11"	11" X 14"	16" X 20"	N E G.	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
3000 GENERAL MAN.									17			9		
4100 SALARY & WAGE ADMIN.	16													
4200 PERSONNEL PRACTICES			40		3				42					
4300 EDUCATION & TRAIN.		58							118					
4400 EMP. COMM. & PUBL. RELATIONS				171	214	128	6		370				6	410
4600 AUXILIARY OPER. & PLANT PROTECT.	5622				19				11					
4700 COMMUNITY		91	56		46				18					
4800 HEALTH & SAFETY			2		94				65					
5300 DESIGN					8	55			16					
5400 PROJECT	6		36		106	128			95					
5500 ENGR. ADMIN.			20		50	6			22					
5700 PILE TECH.			903	34	12	8053		166	226				55	1600
5800 SEPARATIONS TECH			8			391		26	36					

PHOTOGRAPHY UNIT
MONTHLY REPORT, JULY 1956

	I. D.	2" X 3"	4" X 5"	5" X 7"	8" X 10"	8 1/2" X 11"	11" X 11 1/4"	16" X 20"	N E G.	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
6100 REACTOR	42					39			14					
6200 SEPARATIONS				15					3					
6300			264			16			5					
6400 T. PLANT	10													
6700 PURCHASING & STORES					10				10					
6800 ELEC. UTIL.					12				4					
7000 FINANCIAL	43				20	40			6					
8100 RADIOLOGICAL RECORDS & STANDARDS	32		4			12			1					
8200 BIOPHYSICS					4	188			18					
8300 BIOLOGY			11		42	10			33		11		36	
8500 RADIO. ADM. & COMP.	16													
2900 A.E.C.					60									
TOTAL	5787	325	1120	469	712	9066	6	192	1113	11	10	97	1410	

TOTAL ASSIGNMENTS JULY 295 MAY 441
TOTAL NEGATIVES 1,113 842 1,280
TOTAL PRINTS 17,795 19,625 21,853

UNION RELATIONS SECTION

July, 1956

The hearing by the Ching Panel of the project construction dispute concerning the Teamsters, Operating Engineers, and Cement Masons occurred in Spokane on June 18, 1956. The Panel recommended that the parties agree for the remaining period of the area agreements between the Associated General Contractors and the unions involved that isolation pay of \$2.625 per day be continued at Hanford in lieu of the travel pay provisions contained in the current agreement and that bus transportation also be continued for the duration of the agreement.

No date has been set for the arbitration of the issue involving the one-day disciplinary layoff of two mechanics in Transportation. Legal is presently reviewing the case together with two other cases the Council requests be presented to the arbitrator at the same time. One case involves the minimum payment for employees called in one hour in advance of their regular shift; the other concerns the establishing of a new shift schedule in the 20C-W Laundry. Union Relations has recommended to Legal that the three cases be presented for arbitration separately.

In connection with the decentralization of Union Relations, the grievance procedure during the past month has been administered similarly to what will occur subsequent to actual decentralization. In other words, each component is assuming the responsibility for its own grievances even to the point of presenting its cases to the Council at Step II. The Council appears receptive to this arrangement.

The business representative of the Hanford Atomic Metal Trades Council indicated during recent discussions that he would direct a letter to the Company indicating that the Council had withdrawn its objection to the signing of patent agreements. The letter was received on August 3 and referred to Legal for comments. Legal appears to question the propriety of proceeding with the signing of the agreements in view of the language of the Council's letter. They are continuing to study the matter, after which they will advise Union Relations of their conclusions. Approximately 35% of these forms remain to be signed.

The Council was notified by letter on July 26 concerning the cost-of-living increase which resulted from the increase in the Bureau of Labor Statistics' Index for June 1956 over the Index for September 1955. The June 1956 Index was 116.2 which was a 1.13% increase over the September 1955 index of 114.9. In compliance with the Agreement, the "adder" to the base rates of the non-exempt employees was increased by 1.18 percentage points bringing the "adder" from 18% to 19.18%. The letter also reported that isolation pay would be increased from \$8.86 to \$8.96 per week due to the increase in the Index. These increases are effective July 30.

Due to the delay in the sale of Richland houses and the layoff of practically all Community painters on June 30, the Atomic Energy Commission considered it necessary to accomplish the exterior painting of the houses with an outside contractor. From both a union relations and employee relations standpoint, it did not appear desirable to have painters in lack-of-work status while a

a contractor was painting the houses that these laid-off painters otherwise would have been working on. This information was presented to the Commission during a meeting on July 19. As a result, the Commission is agreeable to letting the Company recall all available painters in lack-of-work status (25 to 30) to perform as much work as they can. The balance of the house painting will be given to an outside contractor. On July 31 this information was explained to the HAMTC business representative who indicated it appeared to be satisfactory. The relatively short duration (two to three months) was mentioned to the Union and will be explained to the painters being recalled when they are contacted.

In connection with a contract being let by the AEC to reroof approximately 36 Richland houses, a meeting was held with the HAMTC on July 16. The Council was primarily interested in recalling carpenters in lack-of-work status and avoiding any layoffs in the immediate future. They presented arguments intended to indicate that in their opinion the work in question could be accomplished by project forces and was not necessarily Davis-Bacon work. However, their arguments with respect to D-B work were rather weak and they terminated the discussion themselves with a comment that they wished to consider the Company's position further. To date we have heard nothing further from the Council.

Grievance Statistics:

A total of thirty-seven (37) grievances were received and four (4) Step II grievance meetings were 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	37	0	0	37	0	37
Received this year	286	4	0	290	16	306
Received 1955 through this month	303	3	1	307	15	322
Step I						
Pending June 30	0	0	0	0	0	
Settled this month*	20	0	0	20	1	21
Settled this year	194	3	0	197	4	201
Pending July 31	0	0	0	0	0	
Step II						
Pending June 30	45	0	0	45	0	
Settled this month**	17	0	0	17	0	17
Settled this year	109	4	0	113	11	124
Pending July 31	43	0	0	43	0	
Arbitration						
Pending June 30	8	0	0	8	0	
Settled this month	0	0	0	0	0	
Settled this year	0	0	0	0	0	
Pending July 31	7	0	0	7	0	
Total settled this month	37	0	0	37	1	38
Total settled this year	303	7	0	310	15	325

*

** See note on following page.

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	17	138	8	93	8	50
- Nonunit	0	1	0	0	0	1
Separations - Unit	13	86	9	63	4	36
- Nonunit	0	6	1	2	0	4
Metal Preparation - Unit	4	30	2	23	3	10
Transportation - Unit	1	8	0	3	1	4
Electrical Utilities - Unit	0	1	0	1	0	1
Stores - Unit	0	1	0	0	1	1
Employee & Public Relations						
Community - Unit	0	4	1	3	0	0
Aux. Ops. & Plt. Pro. - Unit	0	14	0	7	0	8
Radiological Sciences - Unit	2	8	0	4	0	3
- Nonunit	0	4	0	1	0	2
Engineering - Nonunit	0	3	0	0	0	3
Financial - Nonunit	0	2	0	1	0	1
TOTAL	<u>37</u>	<u>306</u>	<u>21</u>	<u>201</u>	<u>17</u>	<u>124</u>

BY SUBJECTS

<u>Unit</u>	<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	1	0	0				
Jurisdiction	24	125	0	5	0	1				
Health-Safety-Sanitation	0	7	0	0	0	0				
Hours of Work	0	4	0	2	1	1				
Overtime Rates	5	68	0	3	0	4				
Vacation	1	3	0	0	0	0				
Seniority	1	15	0	3	0	1				
Wage Rates	2	12	0	1	1	1				
Miscellaneous	2	16	0	3	0	0				
Sick Leave	0	8	0	0	0	0				
Transfer	0	1	0	0	0	0				
Grievance Procedure	0	3	0	0	0	0				
Continuity of Service	0	1	0	0	0	0				
Nonunit										
Wage Rates	0	4	0	0	0	0	0	1	0	1
Miscellaneous	0	1	0	0	0	0	0	2	0	1
Hours of Work	0	1	0	0	0	1	0	0	0	0
Sick Leave	0	1	0	0	0	0	0	0	0	0
Distribution of Overtime	0	0	0	0	0	1	0	0	0	0
Job Training	0	0	0	0	0	1	0	0	0	0
Job Assignment	0	0	0	0	0	1	0	0	0	0
TOTAL	<u>35</u>	<u>271</u>	<u>0</u>	<u>18</u>	<u>2</u>	<u>12</u>	<u>0</u>	<u>3</u>	<u>0</u>	<u>2</u>

*Grievances brought to Step II prior to May 1, 1956 but never processed by the union are, for the purpose of this report, considered settled at Step I.

**Grievances which the union formally indicated their intention to submit to arbitration but have taken no further action since May 1, 1956 are, for the purpose of this report considered settled at Step II.

SALARY AND WAGE ADMINISTRATION

1. A report on first-line supervisory differentials in Employee and Public Relations, Financial, Radiological Sciences and Engineering Departments was prepared and issued.
2. Salary data on selected positions were exchanged with the National Lead Company. Salary data on selected positions were transmitted to Employee Compensation Services for submission in surveys being conducted by the Glenn L. Martin Company and by the American Management Association.
3. Wage rate data were exchanged with the Tacoma City Light Department and with the General Chemical Company.
4. Work on questionnaires for the Northwest Area Wage Survey is underway. The survey will be conducted during the coming month.
5. Revision of the Salary Administration Manual in accordance with the new organization and nomenclature is underway.
6. AEC concurrence was received for the application at HAPO of the revised Company-wide schedule of starting rates for Technical and Business Graduates, effective July 30, and for application at HAPO of the Company-wide revisions to the exempt salary structure and modification regarding payments below position rate.
7. Forms required for administering weekly and monthly salaries have been established as stores stock items in preparation for decentralization of these functions. Information on salary and wage records procedures was prepared and issued to those charged with such responsibilities under the new organization.
8. The quarterly report on exempt salaries to the AEC was prepared and issued.
9. A cost-of-living adjustment in rates of non-exempt personnel became effective on July 30.
10. Section personnel expended considerable time during the month reconciling positions within the components of the proposed HAPO organization and in preparing data for reconciliation with other Company components.
11. Fifty-six non-exempt jobs located throughout the plant were audited during the month.
12. A listing of exempt personnel for the proposed organization was prepared and distributed to appropriate personnel. Work on a listing of non-exempt personnel is in progress.
13. A request was submitted to the AEC for establishment of three new classifications in the Procedures & Computing Section's IBM 702 facility operation.

EDUCATION AND TRAINING SECTION

July 1956

PERSONNEL DEVELOPMENT COURSES

The following Personnel Development Courses were presented during the period between June 25 and July 25:

<u>Course</u>	<u>Number of Times Presented</u>	<u>Number in Attendance</u>
Principles and Methods of Supervision and Leadership	1	15
Report Writing	2	32
Customer Relations	3	59
Labor-Management Relations	1	28
Conference Leading	2	33
Cost Control	1	19
Job Relations Development	3	65
Creative Thinking	1	22
HOBOS I	1	137
Exempt Appraisal Plan	1	16
Job Instruction Training	1	8
Effective Human Relations	1	16

"Creative Thinking" was presented to the Kiwanis Club on July 11 at the Desert Inn.

During July, the Technical Graduates awaiting "Q" clearance were presented the following courses by the Training Unit:

1. Conference Leading
2. Report Writing
3. Job Relations Development
4. Creative Thinking
5. Customer Relations

Members of the Training staff assisted in the Technical Graduate Orientation held on July 9, 10 and 11. A member of Training was Master of ceremonies, and two members of Training presented talks in this program. These talks were on "How Our Business System Operates" and "Human Relations in Industry."

SCHOOL OF NUCLEAR ENGINEERING

Grades

Upon the request of 175 students, grades were sent out to respective supervision. This is lower than in past terms.

SCHOOL OF NUCLEAR ENGINEERING (Con't)

Completions

The percentage completions in the School for the past five years are as follows:

Term	Enrollments	Completions	% Completions
Fall 1951	313	178	57
Spring 1952	185	132	71
Fall 1952	188	147	78
Spring 1953	132	110	83
Fall 1953	229	171	75
Spring 1954	227	193	85
Fall 1954	277	227	82
Spring 1955	411	349	85
Fall 1955	526	432	83
Spring 1956	485	411	85

The percentage completion of students continues to be high, even though the enrollment has more than doubled over previous years. Considering the graduate courses only, 93% of these students completed their work.

Course Approvals

During the month, approvals have been received from the State College of Washington on one-half of the outstanding approvals needed for the past two years. The remainder should be completed during the summer.

Student Opinion Survey

Out of 485 questionnaires sent out, 248, or one-half, were returned. Of this number, 125, or one-half of those answering, were taking a course for credit. An average of 5 hours was spent in outside study. The primary reason for taking a course was for personal development, followed by preparation for an advanced course or for credit. The general student feeling was that the books used were appropriate and that the instructors were well prepared. Practically all indicated a desire to continue study in the fall. Many comments were made about the crowded rooms, poor ventilation and black-board glare. Some felt that there was too much material to cover in such a short time.

The college-level and vocational students wanted laboratories and equipment for use in classes to aid in a better understanding. They also indicated a desire for sufficient courses to lead to a degree.

Graduate Affiliations

One hundred and forty-eight graduate students were active in their affiliation with the cooperating schools (registered courses during either the fall or spring term of 1955-56). This compares with 121 during the 1954-55 academic year. The

SCHOOL OF NUCLEAR ENGINEERING (Con't)

major fields of study and schools are shown as follows:

Major Field	U. of Idaho		O. S. C.		W. S. C.		U. of Wash.		Total	
	54-55	55-56	54-55	55-56	54-55	55-56	54-55	55-56	54-55	55-56
Chemical Engr.	25	20	6	11	0	2	2	3	33	36
Chemistry	20	24	5	3	2	4	3	3	30	34
Mech. Engr.	10	15	2	5	2	3	0	1	14	24
Physics	8	12	2	3	0	2	0	3	10	20
Elect. Engr.	12	11	0	1	0	0	2	2	14	14
Metallurgy	5	5	0	0	3	1	1	1	9	7
Mathematics	1	1	2	1	2	3	0	1	5	6
Nuclear Engr.	0	0	2	4	0	0	0	0	2	4
Meteorology	0	0	0	0	0	0	2	1	2	1
Biology	0	0	0	0	1	0	0	0	1	0
Soil Physics	0	0	0	0	1	0	0	0	1	0
Civil Engr.	0	1	0	0	0	0	0	0	0	1
Not specified	0	0	0	0	0	1	0	0	0	1
Total	81	89	19	28	11	16	10	15	121	148

SCHOOL OF NUCLEAR ENGINEERING (Con't)

School Costs

Unit Costs of School operation for the past three years are:

	<u>1953-54</u>	<u>1954-55</u>	<u>1955-56</u>
Enrollment	456	688	1011
Percentage Completions	80	84	84
Net Cost	\$24,260	\$35,952	\$39,788
Net Cost per Student	\$53	\$52	\$44*
Number of Courses	42	53	62
Net Cost per Course	\$578	\$678	\$641

*Cost per student determined on basis of those who actually paid tuition
(114 Technicians not included.)

TECHNICIAN TRAINING PROGRAM

A total of nine new employees have now reported on the Technician Training Program to begin their two-year, work-study activities. Plans are under way to transfer three of the present Hanford employees to the Program, and an additional thirteen will be employed as soon as suitable work locations can be evaluated and established.

One of the group of trainees starting on the Program last year plans to enter college this fall.

PERSONNEL DEVELOPMENT PROGRAM FOR NUCLEAR ENERGY

Present Assignments

<u>Department</u>	<u>Last Month</u>	<u>This Month</u>
<u>Engineering</u>		
File Technology	16	23
Separations Technology	5	7
Design	8	7
Project	6	4
Engr. Administration	1	1
<u>Manufacturing</u>		
Metal Preparation	6	8
Separations	4	5
Reactor	18	29
Transportation	1	1
Purchasing & Stores	2	1
Electric Utility	0	1
<u>Financial</u>		
Procedures & Computing	4	4
<u>Radiological Sciences</u>		
Biology	2	2
Bio-physics	0	3
Records & Standards	0	1
<u>Employee & Public Relations</u>		
Education and Training	12	3
Total	85	100

Permanent Placements

There were six placements off the Program as follows:

File Technology	-	2
Separations	-	1
Reactor	-	2
Electric Utility	-	1

Additions

There were 22 additions to the Program during the month of July. Approximately 7 new graduates are expected to report during August and early September.

PERSONNEL DEVELOPMENT PROGRAM FOR NUCLEAR ENERGY (Con't)

All new graduates and summer program personnel attended an introductory program which was designed to acquaint them with the Hanford organization and the functions of the various departments. The Metal Preparation and Reactor Sections held additional programs to acquaint the graduates with the work activities in their respective sections. A plant tour of the manufacturing facilities in the 300 Area was conducted as part of this orientation program. Information concerning the effectiveness of the introductory program has been gathered and this will be used in formulating next year's program.

Studies are now under way towards the formulation of programs designed to enhance the loyalty attachments of new graduates reporting to Hanford. Contacts are being made with eastern training program supervision to obtain the benefit of previous experience in other locations.

Military Service

There were no losses to the armed forces due to Selective Service during the month.

Deferments are being obtained generally on a one-year basis for the new graduates reporting this summer. Three of the new graduates are scheduled to leave during August for military service due to ROTC commitments in college. This means a total of 56 men have left for service due to college training in the military. Of this number, 19 men have now returned to Hanford.

Many favorable comments have been received from men returning to the Company from military service on the personal contacts maintained with them by this office during their military service.

EMPLOYEE & PUBLIC RELATIONS DEPARTMENT
HEALTH & SAFETY SECTION
JULY 1956

General

Personnel Changes

Two additions and three deletions resulted in a decrease in personnel to 219.

Employee Relations

Employee attendance at 57 meetings was 357.

Visits

Dr. Norwood attended Association Island Conference and visited the Schenectady, KAPL and West Milton Plants.

Industrial Medicine

Treatment was continued intermittently on two operations employees who accidentally inhaled some soluble plutonium June 18, 1956. Urinary excretions suggest that the body deposit not including that in the lungs is probably below the permissible amount in one case but exceeds the allowable limit by an estimated factor of three to ten in the other case. This is therefore the first unequivocal case of body deposit of long life radioactive material exceeding the allowable limit which has occurred at HAPO since start-up.

Safety and Fire Prevention

There was one disabling injury as a result of a rigging accident in moving pipe bins. There were 287 medical treatment cases for the plant and 12 for the community.

Kadlec Hospital

Plans for transfer of the hospital on September 9 to the Methodists are proceeding smoothly. Preferential rates will be used by the Methodists to maintain the present salary levels of hospital employees after transfer.

The average daily adult census increased from 46.0 to 50.2 as compared to 47.1 a year ago.

Rewiring of the hospital and installation of the emergency generator is in progress.

Public Health

The sharp decline in communicable diseases of June continued through July. Two cases of equine encephalitis in the county are causing concern, as the disease is transmissible to humans.

Brief health messages are being broadcast by local TV and radio stations. These combined with weekly health messages in the local newspaper and the Works News are giving good health education coverage.

HEALTH & SAFETY SECTION

JULY 1956

Industrial Medical Services

Dispensary visits increased from 5,242 to 5,861. There was one disabling injury. There were 29 nurses on the non-exempt roll. Two meetings were held for nurses for discussion of radiation hazards.

Examinations decreased from 917 to 856. The total number of examinations completed so far this year is 6,219.

There were two information meetings held for industrial physicians.

Edathamil Calcium-Disodium therapy of two operating employees was continued during the month in an effort to increase elimination of plutonium. Another case involved the surgical removal of tissue from the hand of a construction employee because of imbedded plutonium in the tissue.

Final approval was obtained for moving the industrial medical facilities from Kadlec Hospital to the Medical-Dental Building. The date of the move has been set for August 15, although the dispensary will be operated at Kadlec Hospital until September 9 when the hospital is turned over to the Methodists.

The Health Activities Committee met on July 19th. The health topic for plant distribution was a booklet on "Cancer Facts" prepared by the New York City Cancer Committee. Information on the need for polio vaccine was also distributed plant-wide. Chief item of discussion was a way for continuation of a health activities program following HAPO reorganization. Members expressed strong beliefs that the program had been very beneficial in reduction of plant absenteeism. Information about common health problems has been passed along to all employees for better personal health protection. Committee meetings have also served as a forum of discussion of specific health problems. In view of this, the Committee recommended that each of the operating components in the new organization form a health council to serve that component as this group has served the entire plant.

While net costs for the month of June were higher than normal, costs for the fiscal year were approximately 1.5% less than budgeted. Gross costs of \$577,000 were \$20,000 less than anticipated due mainly to lower salary expense. Other costs were close to budgeted levels. Expense credits were somewhat lower due to the loss of construction revenue. The average cost per employee for Industrial Medical services during FY 1956 was \$54.00 as compared with \$53.88 in FY 1955 and \$54.60 in FY 1954.

Costs-Operations

	<u>June</u>	<u>May</u>	<u>Increase (Decrease)</u>
Salaries	\$36,228	\$33,561	\$ 2,667
Continuity of Service	3,260	3,022	238
Laundry	190	167	23
Utilities, Transportation, Maintenance	4,731	4,408	323
Supplies and Other	<u>6,652</u>	<u>4,622</u>	<u>2,030</u>
Total Gross Costs	51,061	45,780	5,281
Less: Revenue	954	832	(122)
Expense Credits	<u>9,647</u>	<u>6,635</u>	<u>(3,012)</u>
Net Cost of Operation	\$40,460	\$38,313	\$ 2,147

HEALTH & SAFETY SECTION

JULY 1956

<u>Industrial Medical Services (Continued)</u>	<u>June</u>	<u>July</u>	<u>Year to Date</u>
<u>Physical Examinations</u>			
<u>Operations</u>			
Pre-employment	136	90	508
Rehire	25	15	95
Annual	152	159	2204
Interim	9	51	353
A.E.C.	31	22	165
Re-examination and recheck	231	193	1146
Termination	135	86	593
Sub-total	719	616	5064
<u>Contractors</u>			
Annals	0	0	6
Pre-employment	126	152	439
Recheck	69	88	226
Termination and Transfer	2	0	225
Interim	1	0	259
Sub-total	198	240	1155
Total Physical Examinations	917	856	6219
<u>Laboratory Examinations-Clinical</u>			
<u>Operations</u>			
Government	120	112	714
Pre-employment, Termination, Transfer	1703	1116	6446
Annual	967	982	12450
Recheck (Area)	63	285	1967
First Aid	37	74	271
Sub-total	2890	2569	21848
<u>Contractors</u>			
Pre-employment, Termination, Transfer	804	930	5546
Total Clinical Laboratory Examinations	3694	3499	27394
<u>X-Ray</u>			
<u>Operations</u>			
Government	4	5	49
Pre-employment, Termination, Transfer	203	143	756
Annual and Interim	236	255	2960
First Aid	46	38	316
Sub-total	489	441	4081
<u>Contractors</u>			
Pre-employment, Termination, Transfer	137	176	802
First Aid	6	15	44
Sub-total	143	191	846
Total X-Ray	632	632	4927
Electrocardiographs	118	90	951
Physical Therapy Cases Referred	130	101	853

HEALTH & SAFETY SECTION

JULY 1956

<u>Industrial Medical Services (Continued)</u>	<u>June</u>	<u>July</u>	<u>Year to Date</u>
<u>First Aid Treatments</u>			
<u>Operations</u>			
New Occupational Cases	428	512	3170
Occupational Case Retreatments	1428	1729	11023
Non-occupational Treatments	3273	3401	24693
Sub-total	5129	5642	38886
 <u>Construction</u>			
New Occupational Cases	28	68	176
Occupational Case Retreatments	68	137	453
Non-occupational Treatments	17	14	92
Sub-total	113	219	721
 Total First Aid Treatments	5242	5861	39607
 <u>Disabling Injuries</u>			
General Electric	1	1	8
Contractors	0	0	0
Total	1	1	8
 <u>Nurse Visits</u>			
Calls made	1	0	3
Employee Personal Illness	1	0	2
Absent due to illness in family	0	0	0
Not at home when call was made	0	0	1

HEALTH & SAFETY SECTION

JULY 1956

Kadlec Hospital

The average daily adult census increased from 46.0 to 50.2 as compared with 47.1 a year ago. This represents an occupancy percentage of 46.1 broken down as follows: Mixed Services (Medical, Surgical, Pediatrics) 47.2; Obstetrical Service 41.4. A further breakdown of the Mixed Services shows Medical 44.6, Surgical 63.8 and Pediatrics 24.2.

The maximum and minimum daily census ranged as follows:

	<u>Maximum</u>	<u>Minimum</u>
Mixed Services	56	28
Obstetrical Service	15	2
Total Adult	63	35

The average daily newborn census decreased from 10.0 to 9.2 as compared with 10.5 a year ago.

Nursing hours per patient day:

Medical, Surgical & Pediatrics	3.81
Obstetrical	4.32
Newborn	3.92
Total Adult	3.89

Nursing hours in July decreased from 3.94 to 3.89 as a result of the increased census.

The ratio of hospital inpatient employees to patients (excluding newborn) for the month of June was 2.46. When newborn are included the ratio is 2.08.

The net expense for the operation of Kadlec Hospital for June was \$31,467 as compared with \$15,771 for May. Summary is as follows:

Kadlec Hospital net expense \$31,467
This represents an increase of \$15,696 over May which is primarily the result of a lower patient census, increased maintenance costs, and a reversal of the accrual of Public Liability Claims in May. These three items alone amounted to approximately \$14,000. Gross costs increased \$6,307 and expense credits decreased \$39.00.

Work is under way on the rewiring of the hospital and on the installation of the emergency generator and appears to be progressing satisfactorily.

On the transfer of the hospital, Dr. Turner has announced to our people that it appears that salaries for those on the roll at the time of the transfer will remain at their current level but that a new wage structure is established subsequent to September 10, 1956.

HEALTH & SAFETY SECTION

JULY 1956

Hospital Unit (Continued)

Arrangements are being worked out with Employment for some system of terminations for hospital employees during the last week of General Electric's operation which will enable us to complete them without disrupting the operation of the hospital.

— Attendance at employee relations meetings for Health and Safety Section follows:

	<u>Meetings</u>	<u>Attendance</u>
Hospital	38	245
Industrial Medicine	5	37
Public Health	10	51
Safety & Fire Prevention	1	11
General	<u>2</u>	<u>13</u>
Total	56	357

HEALTH & SAFETY SECTION

JULY 1956

<u>Hospital Unit (Continued)</u>	<u>June</u>	<u>July</u>	<u>Year to Date</u>
<u>Kadlec Hospital</u>			
Average Daily Adult Census	46.0	50.2	56.7
Medical	13.6	16.5	19.0
Surgical	16.8	20.4	20.9
Pediatrics	4.7	4.6	7.9
Mixed	35.3	41.5	47.8
Obstetrical	10.7	8.7	8.9
Average Daily Newborn Census	10.0	9.2	9.2
Maximum Daily Census:			
Mixed Services	45	56	72
Obstetrical	21	15	21
Total Adult Census	57	63	83
Minimum Daily Census:			
Mixed Services	21	28	21
Obstetrical Service	4	2	2
Total Adult Census	31	35	29
Admissions: Adult	311	343	2599
Discharges: Adult	325	312	2569
Medical	72	64	598
Surgical	123	133	1086
Pediatrics	49	52	427
Mixed	244	249	2111
Obstetrical	81	63	458
Newborn	74	59	427
Patient Days: Adult	1380	1556	12110
Medical	409	510	4056
Surgical	503	632	4461
Pediatrics	147	144	1690
Mixed	1059	1286	10207
Obstetrical	321	270	1903
Newborn	300	284	1957
Average Length of Stay: Adults	4.2	5.0	5.0
Medical	5.7	8.0	6.8
Surgical	4.1	4.8	4.1
Pediatrics	3.0	2.8	4.0
Mixed	4.3	5.2	4.8
Obstetrical	4.0	4.3	4.2
Newborn	4.1	4.8	4.6
Occupancy Percentage: Adults	42.2	46.1	52.0
Medical	36.8	44.6	51.4
Surgical	52.5	63.8	65.3
Pediatrics	25.8	24.2	41.6
Mixed	40.1	47.2	54.3
Obstetrical	51.0	41.4	42.4
Newborn	38.5	35.4	35.4
(Occupancy Percentage based on 109 adult beds and 26 bassinets.)			

HEALTH & SAFETY SECTION

JULY 1956

<u>Hospital Unit (Continued)</u>	<u>June</u>	<u>July</u>	<u>Year to Date</u>
Avg. Nursing Hours per Patient Day:			
Medical, Surgical, Pediatrics	3.08	3.81	
Obstetrics	3.65	4.32	
Newborn	3.60	3.92	
Avg. No. Employees per Patient (excluding newborn)	2.46		
Operations: Major	41	61	363
Minor	51	54	346
E.E.N.T.	39	35	389
Dental	2	1	10
Births: Live	68	64	433
Still	0	0	1
Deaths	0	3	25
Hospital Net Death Rate	0	.27%	.30%
Net Autopsy Rate	0	66.6	52.0
Discharged against advice	0	0	3
One Day Cases	74	67	595
Admission Sources:			
Richland	85.9	77.8	82.9
North Richland	0	0	.2
Other	14.1	22.2	16.9
Admissions by Employment:			
General Electric	80.1	76.4	78.8
Government	2.6	3.5	3.4
Facility	4.5	5.5	5.7
Contractors	2.9	4.1	2.6
Schools	.6	.9	1.5
Others	9.3	9.6	8.0
Hospital Outpatients:			
First Aid	494	503	3214
Clinical Laboratory	167	135	1119
Bacteriological Laboratory	30	43	385
X-Ray	101	177	821
Physical Therapy	310	238	1834
Physical Therapy Treatments			
Outpatient Treatments	180	137	1534
Inpatient Treatments	72	87	792
Total	252	224	2327
Pharmacy			
No. of Prescriptions Filled	2363	2602	18266
No. of Store Orders Filled	479	535	3663

HEALTH & SAFETY SECTION

JULY 1956

Hospital Unit (Continued)	June	July	Year to Date
<u>Kadlec Hospital (Continued)</u>			
<u>Clinical Laboratory Examinations</u>			
Outpatient Examinations	406	340	3247
Hospital	2555	2928	21329
Total	2961	3268	24576
<u>X-Ray Examinations</u>			
Outpatient Examinations	109	192	819
Hospital	140	155	1286
Public Health	6	0	84
Total	255	347	2189
<u>Electrocardiographs</u>			
Outpatient Examinations	1	0	2
Hospital	17	26	232
Total	18	26	234
<u>Bacteriological Laboratory</u>			
Treated Water Samples	194	260	1389
Milk Samples (Inc.Cream & Ice Cream)	40	40	276
Other Bacteriological Tests	271	331	2745
Total	505	631	4410
<u>Patient Meals</u>			
Regulars	2030	2520	17564
Children under 8	305	270	3630
Specials	703	772	6638
Softs	476	382	3737
Tonsil and Adenoid	53	54	644
Liquids	157	132	997
Surgical Liquids	64	70	493
Total	3788	4200	33703
<u>Cafeteria Meals</u>			
Noon	1390	1330	9544
Night	230	251	1696
Total	1620	1581	11240

HEALTH & SAFETY SECTION

JULY 1956

Public Health Unit

Communicable disease reports again fell off sharply to a low of 45, only 21% of the June total. Chickenpox and measles led the list of reports with 14 and 11 cases respectively. This led to a reduction of 20% in field nursing visits, occasioned largely by the reduced communicable disease load.

Dr. Ellen McNellis, Crippled Children's Program Director, of the State Department of Health, visited the Unit. She discussed the program and its administration and recommended that our social service counselors work with the Seattle team.

The health officer and staff members met with the Jason Lee School PTA health committee. The committee's plans for a health program involving assistance to school administration were reviewed and discussed.

A clinic for handicapped children was held with Dr. C. Don Platner, Walla Walla orthopedist, in attendance. Dr. Platner examined 11 children.

The Unit's plans for brief health messages are being widely used. Three TV stations are using one-minute health films, produced by Audio-Visual, using dramatic situations combined with a message from the health officer. Featuring summer topics, four local radio stations are also broadcasting similar messages. Rounding out the program are weekly articles in the Tri-City Herald and Works News.

During the month of July thirteen new families were accepted for counseling. Active work with thirteen families was ended as the problems were resolved satisfactorily, while there were 81 families with whom work will continue in August.

Of 245 interviews, 22 were focused on marital problems, 102 on parent-child relationships, 112 on personality problems of adolescents and adults. There were two problems of mental illness; five problems concerned intellectual retardation; one was a medical problem and one situation involved economic need.

Bacteriological tests on samples of milk products have begun to show an increase. The dairies have been notified and rechecks will be made as soon as practical.

The sanitary land fill presently located at the end of Duane Street will remain temporarily at this site under present plans. This was recommended by this Unit in order to fill the area and help to eliminate a large potential mosquito breeding area.

Dog bites have lessened considerably this month from the record peak in March and April, but continue to present a problem.

Many reports of insect infestation in homes have been received. Recommendations have been made to householders on means of control.

Routine restaurant, water, and swimming pool checks continue to be satisfactory.

HEALTH & SAFETY SECTION

JULY 1956

<u>Public Health (Continued)</u>	<u>June</u>	<u>July</u>	<u>Year to Date</u>
<u>Education</u>			
Pamphlets distributed	11,988	10,989	75,894
News Releases	6	8	70
Staff Meetings	5	5	27
Classes	7	1	92
Attendance	70	4	1,585
Lectures & Talks	3	3	52
Attendance	55	107	2,648
Films Shown	14	1	91
Attendance	131	40	3,092
Community Conferences & Meetings	13	16	102
Radio Broadcasts	1	5	39
TV Broadcasts	3	5	36
<u>Immunizations</u>			
Diphtheria Completed	0	0	18
Diphtheria Booster	0	0	954
DPT Booster	354	1	355
Smallpox	452	3	1,916
DT Completed	0	42	159
DT Booster	4	0	4
Typhoid	0	1	1
Typhoid Booster	1	0	1
Tuberculin Test	6	18	223
Immune Globulin	3	0	558
Other	0	0	13
Tetanus	0	0	132
Tetanus Booster	0	0	1
<u>Social Service</u>			
Cases carried over	77	81	464
Cases admitted	21	13	157
Cases closed	14	13	115
Remaining case load	84	81	506
Activities:			
Out of office	4	2	32
Office Interviews	244	243	1,660
Conferences	49	35	363
Meetings	44	40	322
<u>Sanitation</u>			
Inspections made	87	43	504
Conferences held	31	11	191

HEALTH & SAFETY SECTION

JULY 1956

Public Health (Continued)	June	July	Year to Date
<u>Communicable Diseases</u>			
Chickenpox	40	14	228
Erysipelas	0	0	2
Food Poisoning	0	0	4
German Measles	16	8	88
Impetigo	0	1	5
Infectious Hepatitis	2	1	4
Measles	124	11	714
Mumps	17	3	88
Pinkeye	1	1	6
Ringworm	1	2	5
Roseola	5	2	26
Scarlet Fever	8	2	51
Strep. Infection (Throat)	2	0	23
Thrush	0	0	2
Tuberculosis	0	0	2
Whooping Cough	0	0	80
Total	216	45	1,328
 Total No. Nursing Field Visits	 316	 252	 2,526
Total No. Nursing Office Visits	14	13	139

COMMUNITY SECTION

JULY 1956

ORGANIZATION AND PERSONNEL:

	<u>BEGINNING OF MONTH</u>		<u>END OF MONTH</u>	
	<u>EXEMPT</u>	<u>NONEXEMPT</u>	<u>EXEMPT</u>	<u>NONEXEMPT</u>
Community Administration	1	1	1	1
Maintenance & Renovation Unit	7	104	6	67
Police Unit	13	24	13	27
Commercial & Residential Property Unit	5	21	5	22
Fire Unit (Includes 32 Firemen)	48	0	49	0
Electrical Unit	4	16	4	16
Transfer Study	1	1	1	1
Engineering Unit	2	4	3	4
Water & Sewerage Utilities Unit	6	27	6	27
Library Unit	3*	9**	4*	10**
Public Works & Recreation Unit	6	46	6	50
	96	253	98	225

	<u>Exempt</u>	<u>Nonexempt</u>
Additions to Payroll	2	5
Transfers In	0	6
Removals from Payroll	0	1
Transfers Out	1	37
Net decrease	26	

*Includes one half-time employee.

**Includes two half-time employees.

MAINTENANCE AND RENOVATION UNIT

July, 1956

	<u>Exempt</u>	<u>Nonexempt</u>
Employees - Beginning of month	7	104
New hires	0	1
Transfers in	0	2
Transfers out	0	40
Leave of absence - illness	0	1
Downgrade from exempt to nonexempt	1	1
Employees - End of month	6	67

NOTE:

The reduction of personnel is due to transfers made in connection with the reduction of force which took place when program painting was discontinued on June 29, 1956.

PLUMBING SHOP

July, 1956

FOREMAN: F. L. ELSSENHORN

Electric water heaters replaced	14
Laundry trays replaced	16
Miscellaneous plumbing work orders completed	33
Miscellaneous steam work orders completed	37
Plumbing for floor and sink linoleum	46
Cleared major sewer stoppages caused by tree roots	50
Cleared major sewer stoppages in main sewers	10
Sidewalks replaced and parking compounds repaired	2
Street steps replaced	19
Plumbing and steam repairs in hospital & public health bldg.	25.0 hrs.
Work caused by high water in the park	17.0 hrs.
Worked on plumbing service orders	70.7 hrs.
Hauled salvage material to North Richland	13.0 hrs.
Loaned one man to Administration Area Maintenance	16.0 hrs.

Dug out old well, installed cement cap, and refilled.

Removed, tested, repaired, and reinstalled relief valves in all Government owned dormitories, apartments, and commercial buildings.

Repaired and repacked Minneapolis-Honeywell steam control valves in all the Gilmore and Gribble Government owned apartments.

Made routine steam inspection once each week in Government owned commercial facilities, dormitories, and apartments.

Excavated with backhoe machine, for this Unit and for Public Works, for the cleaning out of roots in sewer lines and to repair all leaking and broken underground piping; backfilled, and landscaped excavated portions.

SERVICE ORDER CREW

FOREMAN: G. O. DENNEY

A. Service orders on hand at beginning of month	471
B. Received during the month	2126
C. Completed during the month	1800
D. On hand at end of the month	797

E. A total of 94 manhours were expended on work orders.

F. Backlog of service orders by craft:

Plumbing	58	
Electrical	460	(This includes 436 fire inspection orders)
Carpentry	<u>219</u>	
Total	797	

MECHANICAL SHOP AND RENOVATION AND LABOR CREW

July, 1956

FOREMAN: Z. H. MAYBERRY

A. Millwright Crew:

Routine furnace inspections	230
Furnace service orders	59

Made conversion of Davis fork to fit Ford Tractor.

Replaced all cooler pads in 1116 Building.

Miscellaneous repairs to air conditioners.

B. Sheetmetal Crew:

Smoke pipes replaced	11
Shower stalls fabricated and installed	2
Coal hatch flashings replaced	7
Rain gutters replaced	9
Constructed water proof pans for 770 Bldg.	2
Patched holes in furnace jackets	2
Insulated air conditioner duct	1
Fabricated aluminum liners for pickup trucks	2

C. Service Crew:

Tree removal orders completed	25
Stump removals completed for Electrical Dist.	41
Dug out basements to remove odors	1
Trimmed tree limbs	3
Removed trash, broken blacktop, weeds, paper, etc.	7

D. Renovation Crew:

Houses renovated	17
Houses sprayed for insects	6
Minor carpentry repair orders	17
Renovation trash pickups	15

Provided weekly service of delivering linens and janitorial supplied to occupied dormitories.

Provided weekly pickup and delivery of laundry from various General Electric Company units to Richland Laundry and Dry Cleaners.

LINOLEUM AND CARPENTER SHOP

July, 1956

FOREMAN: R. M. MARTIN

Replaced bath wall tile	12
Repaired bath wall tile	2
Replaced bath floor linoleum	8
Repaired bath floor linoleum	4
Replaced kitchen floor linoleum	15
Repaired kitchen floor linoleum	3
Replaced bedroom floor linoleum	1
Repaired bedroom floor linoleum	1
Replaced living room floor linoleum	2
Repaired living room floor linoleum	4
Replaced utility room floor linoleum	2
Repaired utility room floor linoleum	1
Replaced dining room floor linoleum	1
Replaced linoleum on steps and landing	11
Replaced sink top linoleum	33
Repaired sink top linoleum	5
Replaced work bench linoleum	4
Replaced sinks	5
Repaired linoleum in Kadlec Hospital	3
Repaired linoleum in Public Health Building	2
Repaired roofs	4
Repaired siding	7
Repaired walls	9
Repaired ceilings	2
Replaced ranch house screens	49
Replaced floor boards	1
Repaired screen doors	7
Repaired exterior doors	4
Repaired interior doors	4
Repaired porches	31
Repaired basement stairs	5
Replaced prefab window screens	41
Repaired street steps	14
Repaired ceiling - The Mart	1
Repaired floors - dormitories	2
Replaced thresholds	3
Installed sill caps	7
Installed new tub moldings	3
Chempoints	65
Paint touch ups	100
Jack & shim	1

COMMUNITY SECTION
RICHLAND POLICE DEPARTMENT
MONTHLY REPORT
AUGUST 1956

ORGANIZATION

	EXEMPT	NON-EXEMPT
EMPLOYEES - BEGINNING OF MONTH	13	24
TRANSFERS IN	0	0
TRANSFERS OUT	0	0
NEW HIRES	0	3
TERMINATIONS	<u>0</u>	<u>0</u>
TOTAL - END OF MONTH	13	27

GENERAL

DURING THE MONTH, THREE NEW PATROLMEN WERE RECEIVED AT THIS DEPARTMENT, REPLACING MEN PREVIOUSLY LOST BY TRANSFER TO THE SECURITY PATROL, AND ONE GRANTED A MILITARY LEAVE OF ABSENCE.

RICHLAND RECEIVED A TRAFFIC SAFETY AWARD THIS MONTH FROM THE INTERNATIONAL ASSOCIATION OF CHIEFS OF POLICE. THE AWARD IS A "CERTIFICATE OF ACHIEVEMENT IN POLICE TRAFFIC SUPERVISION IN 1955". THE AWARD WAS MADE FOR CITIES COMPETING IN THE 10,000 TO 25,000 POPULATION GROUP THROUGHOUT THE NATION.

TWO NEW FORD SEDANS WERE RECEIVED THIS MONTH, REPLACING TWO OLDER VEHICLES WHICH HAVE BEEN TURNED IN TO TRANSPORTATION.

A NEW TRAFFIC SAFETY FILM, ENTITLED "THE CASE OF OFFICER HALLIBRAND", WAS RECEIVED THIS MONTH AND WILL BE AVAILABLE IN CONNECTION WITH SHOWINGS OF TRAFFIC FILMS AT SAFETY MEETINGS AND FOR USE IN OUR GENERAL TRAFFIC SAFETY PROGRAM.

THE ANNUAL STREET STRIPING PROGRAM WAS COMPLETED ON JUNE 30 AND INCLUDED APPROXIMATELY 43 MILES OF ARTERIAL CENTER LINES, 176 CROSSWALKS, 3½ MILES OF YELLOW CURBING, 35 STREET "SPEED" STENCILS, AND 12 STREET STENCILS READING "SLOW DOWN AND LIVE".

ONE GROUP OF CUB SCOUTS WAS ESCORTED ON TOUR OF POLICE HEADQUARTERS DURING THE MONTH.

TRAFFIC

RICHLAND	1956		1955		1956	1955
	JUNE	JULY	JUNE	JULY	TOTAL TO DATE	TOTAL SAME PERIOD
REPORTABLE ACCIDENTS	14	11	22	10	163	129
PROPERTY DAMAGE ACCIDENTS	10	8	19	6	142	111
INJURY ACCIDENTS	3	3	3	4	20	18
TOTAL PERSONS INJURED	6	4	3	5	26	22
FATAL ACCIDENTS	1	0	0	0	1	0
ACCIDENTS-DAYLIGHT HOURS	12	9	19	7	127	94
DARKNESS HOURS	2	2	2	3	36	35
ACCIDENTS-BUSINESS DISTRICT	7	4	10	4	50	36
RESIDENTIAL "	6	6	7	5	100	68
OTHER "	1	1	5	1	13	25
ACCIDENTS INVESTIGATED	9	7	15	8	104	87
CRIMINAL COMPLAINTS FILED	5	4	8	4	62	45
VIOLATIONS CONTRIBUTING TO ACCIDENTS:						
NEGLIGENT DRIVING	1	0	1	4	24	17
FAIL. TO YIELD RIGHT OF WAY	7	1	11	4	51	39
FOLLOWING TOO CLOSELY	1	4	5	0	22	17
DRUNK DRIVING	0	0	0	0	2	2
PEDESTRIAN VIOLATION	0	1	0	1	3	4
INATTENTION TO DRIVING	0	0	0	0	1	2
RECKLESS DRIVING	0	0	0	0	0	1
SPEEDING	1	0	0	0	2	1
UNSAFE SPEED	0	1	0	0	40	18
IMPROPER BACKING	0	0	1	0	2	7
IMPROPER PARKING	0	0	0	0	0	0
DISREGARDING STOP SIGN	0	0	0	0	0	4
HIT AND RUN	0	0	0	0	0	2
IMPROPER PASSING	0	2	0	1	5	4
IMPROPER TURN	3	0	0	0	6	3
FAILURE TO SIGNAL	0	0	0	0	0	1
DEFECTIVE EQUIPMENT	0	1	0	0	2	2
WRONG SIDE OF ROAD	0	0	0	0	0	1
ANIMAL IN ROAD	0	0	1	0	0	2
BICYCLE VIOLATION	1	0	3	0	1	3
IMPROPER START. FRM PKD POSITION	0	1	0	0	1	0

RICHLAND	1956		AVE. PER ACCIDENT		AVE. PER ACCIDENT	
	JUNE	JULY	1956	JUNE	1955	JULY
ACCIDENT PROPERTY DAMAGE	\$2,893.46	\$2,871.00	\$206.68	\$231.00	\$194.14	\$277.50

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	5
NUMBER OF MEN FIRED OVER THE ARMY-L COURSE	5

QUALIFICATIONS ON THE ARMY-L COURSE AS FOLLOWS:

EXPERT	1	20%	MARKSMAN	3	60%
SHARPSHOOTER	1	20%	UNQUALIFIED	0	00%

ACTIVITIES	MAY	JUNE	JULY
BANK ESCORTS AND DETAILS	0	0	0
BIKES IMPOUNDED	6	2	12
BIKES REGISTERED	113	14	27
CHILDREN LOST AND FOUND	27	17	12
COMPLAINTS INVESTIGATED	119	136	117
DEATHS REPORTED	0	0	2
DOG, CAT, OTHER ANIMAL COMPLAINTS	15	16	20
DOGS, OTHER ANIMALS, RPTD LOST/FOUND	8	18	22
DOORS, WINDOWS, RPTD OPEN IN FACILITIES	82	87	39
EMERGENCY MESSAGES DELIVERED	2	12	7
FIRES INVESTIGATED	13	14	4
GUNS REGISTERED	4	4	3
LAW ENFORCEMENT AGENCIES ASSISTED	9	12	9
LETTERS OF INQUIRY	97	109	117
MISCELLANEOUS ESCORTS AND DETAILS	9	7	6
PERSONS INJURED BY DOGS	2	4	4
PLANT DEPARTMENTS ASSISTED	38	20	14
PRIVATE INDIVIDUALS ASSISTED	32	54	57
PRISONERS PROCESSED THROUGH JAIL	3	6	8
PROPERTY LOST AND FOUND	19	16	25
RECORDS INQUIRIES	25	24	23
REPORTS PROCESSED THROUGH RECORDS	218	151	151
STREET LIGHTS OUT REPORTED TO ELEC.	102	122	89
TRAFFIC SAFETY MEETINGS (JULY ATT. 487)	10	16	9
TOTALS	953	861	777

MONTHLY REPORT
 RICHLAND POLICE DEPARTMENT
 JULY 1956

OFFENSES	KNOWN	UNFOUNDED	CLEARED OTHER	CLEARED ARREST
PART I				
1. CRIMINAL HOMICIDE	-	-	-	-
A. MURDER & NON. NEG. MANS.	-	-	-	-
B. MANS. BY NEGLIGENCE	-	-	-	-
2. RAPE	-	-	-	-
3. ROBBERY	-	-	-	-
4. AGGRAVATED ASSAULT	1	-	-	1
5. BURG-BREAK. & ENTRY	1	1	-	-
6. LARCENY OVER \$50.00	4	-	-	1
UNDER \$50.00	28	-	2	1
7. AUTO THEFT	1	-	1	-
TOTAL PART I CASES	35	1	3	3
PART II				
8. OTHER ASSAULTS	-	-	-	-
9. FORGERY & COUNTERFEIT	-	-	-	-
10. EMBEZZLEMENT & FRAUD	-	-	-	-
11. STOLEN PROP:BUY:RECEIVE	-	-	-	-
12. WEAPONS:CARRY:POSSESSING	-	-	-	-
13. PROSTITUTION	-	-	-	-
14. SEX OFFENSES	2	-	-	1
15. OFFENSES AG. FAM. & CHILD	-	-	-	-
16. NARCOTICS	-	-	-	-
17. LIQUOR LAWS	-	-	-	-
18. DRUNKENNESS	3	-	-	3
19. DISORDERLY CONDUCT	-	-	-	-
20. VAGRANCY	-	-	-	-
21. GAMBLING	-	-	-	-
22. DRUNK DRIVING	-	-	-	-
23. VIOL. ROAD & DRIVING LAWS:				
FAILURE TO STOP & IDENTIFY	2	-	-	2
SPEEDING	28	-	13	15
STOP SIGN	14	-	4	10
NEGLIGENT DRIVING	17	-	-	17
RIGHT OF WAY	3	-	1	2
RECKLESS DRIVING	1	-	-	1

OFFENSES	KNOWN	UNFOUNDED	CLEARED OTHER	CLEARED ARREST
DEFECTIVE EQUIPMENT	14	-	13	1
ILLEGAL PASSING	-	-	-	-
24. PARKING	35	-	13	22
25. ALL OTHER TRAFFIC VIOLATIONS	13	-	4	9
26. ALL OTHER OFFENSES:				
VANDALISM	6	-	-	-
PUBLIC NUISANCE	5	-	2	3
MISCHIEF	8	-	6	-
BIKE VIOLATIONS	12	-	12	-
ILLEGAL USE OF FIREARMS	1	-	1	-
TRESPASSING	1	-	1	-
SHOPLIFTING	5	-	5	-
ACCIDENTAL DROWNING	1	-	1	-
ALLOWING VICIOUS ANIMAL TO RUN	1	-	-	1
DOG POISONING	1	1	-	-
AMNESIA VICTIM	1	-	1	-
PROWLER	2	-	1	-
27. SUSPICION	-	-	-	-
TOTAL PART II CASES	256	1	78	87
PART III				
28. MISSING PERSONS	7	-	7	-
LOST PERSONS	5	-	5	-
LOST ANIMALS	6	-	2	-
LOST PROPERTY	2	-	1	-
29. FOUND PERSONS	6	-	6	-
FOUND PROPERTY	7	-	2	-
FOUND ANIMALS	6	-	2	-
TOTAL PART III CASES	39	-	25	-

OFFENSES		KNOWN	UNFOUNDED	CLEARED OTHER	CLEARED ARREST
PART IV					
30.	FAT. M.V. TRAFF. ACCID.	-	-	-	-
31.	PERS. INJ. M.V. TRAFF. ACCID.	3	-	-	-
32.	PROP. DAM. M.V. ACCID.	8	-	-	-
33.	OTHER TRAFFIC ACCIDENTS	-	-	-	-
34.	PUBLIC ACCIDENTS	No Accurate Statistics Kept			
35.	HOME ACCIDENTS	-	-	-	-
36.	OCCUPATIONAL ACCIDENTS	-	-	-	-
37.	FIREARMS ACCIDENTS	4	-	-	-
38.	DOG BITES	-	-	-	-
39.	SUICIDES	-	-	-	-
40.	SUICIDE ATTEMPTS	-	-	-	-
41.	SUD. DEATH & BOD. FOUND	-	-	-	-
42.	SICK CARED FOR	-	-	-	-
43.	MENTAL CASES	1	-	1	-
TOTAL PART IV CASES		16	-	1	-
COMPOSITE TOTALS					
PART I, II, III, IV CASES		346	2	107	90

CASES LISTED UNDER "CLEARED OTHER" ARE THOSE CLEARED BY VARIOUS MEANS OTHER THAN ARREST, SUCH AS: ORDER FROM THE PROSECUTOR, JUVENILE PROBATION OFFICER OR OTHER SITUATIONS IN WHICH A MUTUAL AGREEMENT IS OBTAINED. THEY ARE DEFINITELY CLEARED CASES AND DIFFER FROM THE ARREST COLUMN ONLY IN THAT THERE WAS NO ARREST.

PROPERTY REPORTED STOLEN	RICHLAND	\$3,440.25
PROPERTY RECOVERED	RICHLAND	2,349.00

MONTHLY REPORT		RICHLAND POLICE DEPARTMENT										JULY 1956			
OFFENSES	NO. CASES	JUVENILES	SEX	4	6	7	9	10	11	12	13	14	15	16	17
MISCHIEF	6	12	10M 2F				1	1	2	2	1	1	1	1	3
TRESPASSING	1	4	M	1	1	1	1								
SHOPLIFTING	5	8	7M 1F				2			1	2	3			
LARCENY	1	1	M									1			
TOTALS	13	25		1	1	1	4	1	2	1	4	5	1	1	3

RICHLAND POLICE DEPARTMENT
RICHLAND JUSTICE COURT CASES
JULY, 1956

VIOLATIONS	CASES										FINES	
	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	SUSP.
NO DRIVER'S LICENSE	7	4	1	1	1				\$ 5.00	\$ 22.50	\$ 4.00	(1)
NO CERT OF REGISTRATION	1	1	1						12.50			
DEFECTIVE EQUIPMENT	1	1								10.00		(1)
NEGLIGENT DRIVING	17	9	7	1				1	225.00	307.50	102.50	(6)
SPEEDING	16	10	6					3	55.00	95.00	12.50	(2)
STOP SIGN	10	6	3	1					20.00	42.50	14.00	(3)
FTYROW	2	2	18							67.50	20.00	(2)
ILLEGAL PARKING	29	6	5						69.00	14.00		
INVALID VEHICLE LICENSE	2	2								17.50		
FAIL COMPLY RESTR SIGNS	5	3	2					2	20.50	25.00	5.00	(1)
FTS & I	2	1		1						75.00	25.00	(1)
INTERFERING w/OFFICER	1			1								
INATTENTION TO DRIVING	1	1								27.50	10.00	(1)
FOLLOWING TOO CLOSELY	1	1								15.00		
PUBLIC INTOXICATION	1	1								52.50	37.50	(1)
PUBLIC NUISANCE	5	3	2					1	27.50	65.00	32.50	(3)
LARCENY BY CHECK	1			1								
2ND DEGREE ASSAULT	1											
PERM VICIOUS ANIMAL												
TO RUN AT LARGE	1	1								27.50	25.00	(1)
TOTALS	104	51	40	8	5	1	1	7	434.50	864.00	295.50	(23)

1 PUBLIC NUISANCE - PLACED ON PROBATION 6 MONTHS PENDING NO TRAFFIC VIOLATIONS.
1 2ND DEGREE ASSAULT - BOUND OVER TO SUPERIOR COURT, COMMITTED TO JAIL IN LIEU OF FINE & BAIL.
1 NEGLIGENT DRVG - DRIVER'S LICENSE HELD BY COURT FOR 90 DAYS.

COMMERCIAL AND RESIDENTIAL PROPERTY UNIT
COMMUNITY SECTION
July, 1956

PERSONNEL - COMMERCIAL AND RESIDENTIAL PROPERTY UNIT:

	<u>Exempt</u>	<u>Non-Exempt</u>
Employees - beginning of month	5	21
Transfers In	0	2
Transfers Out	0	2
New Hires	0	1
Terminations	<u>0</u>	<u>0</u>
Employees - end of month	5	22

PERSONNEL - COMMERCIAL AND NONCOMMERCIAL FACILITIES:

	<u>Commercial</u>	<u>Noncommercial</u>	<u>Total</u>
June	1600	80	1680
July	1595	78	1673
Net Change	-5	-2	-7

SUMMARY OF ROUTINE ITEMS PROCESSED:

	<u>Commercial</u>	<u>Noncommercial</u>	<u>Total</u>
Work Orders	44	2	46
Back Charges	0	0	0
FY Work Orders	499	39	538
FY Back Charges	12	2	14

CONTRACTS AND NEGOTIATIONS:

Supplemental Agreement

V. O. McVicker - Building No. 4 - to provide for the operation of a real estate and insurance office by Lessee.

GENERAL

A. Commercial

1. Hubert Moore opened for business d/b/a Westgate Conoco.
2. Robert E. Brown subleased space in the Automatic Laundry Co. building for the operation of an insurance office.
3. Irene Bloodworth, d/b/a Parkway Beauty Salon, terminated her sublease in the W. D. Gray building.

4. Notice was received of completion and final inspection of the following buildings:

- a. Parker Hanson, Investment Building, Westgate
- b. L. G. Cook, Investment Building, Westgate
- c. Colin Bleiler, Columbia Service Station
- d. W. D. Gray, Investment Building Addition
- e. True's Oil Co., Service Station

B. Noncommercial

- 1. A plot of land at 1632 George Washington Way, which had been leased to the Richland Baptist Church, was sold to the church on July 16, 1956.
- 2. Two pasture permits were assigned.
- 3. Three private boat moorage permits were issued and three were assigned.

COMMERCIAL PROSPECTS:

Inquiries were received during the month concerning the establishment of the following types of enterprises in Richland.

Tavern

Building Supplies and Nursery Products

SUMMARY OF OCCUPANCY AND EXPANSION STATUS:

A. Commercial	<u>JUNE</u>	<u>JULY</u>
1. Number of Government-Owned Buildings	40	40
a. Number of Businesses operated by Prime Lessees	37	37
(1) Number opened	0	0
(2) Number closed	1	0
b. Number of Businesses operated by Sublessees	24	23
(1) Number opened	1	0
(2) Number closed	2	1
Total Businesses in Government-Owned Buildings	61	60
2. Doctors and Dentists in Private Practice	31	31
3. Number of Privately-Owned Buildings	85	85
a. Number of Businesses operated by Prime Lessees	55	56
(1) Number opened	0	1
(2) Number closed	0	0

	<u>JUNE</u>	<u>JULY</u>
b. Number of Business operated by Sublessees	124	125
(1) Number opened	1	1
(2) Number closed	2	0
Total Businesses in Privately-Owned Buildings	179	181
4. Privately-Owned Buildings under Construction	8	3
5. Total Number of Businesses in Operation	240	241
a. Total openings	2	2
b. Total closings	5	1
B. Noncommercial		
1. Government-Owned Buildings		
a. Clubs and Organizations	5	5
b. Government Agencies	2	2
Total	<u>7</u>	<u>7</u>
2. Privately-Owned Buildings		
a. Completed and in Use	13	13
b. Under Construction	2	2
3. Church Plots and Buildings in Private Ownership	15	16
4. Pasture Land Permits	93	93
5. Private Boat Moorage Permits	66	69

PROGRESS REPORT

	Orders Incomplete June 30, 1956	Orders Issued 7-1 to 7-31	Total Orders Incomplete July 31, 1956
Service Orders	597	2184	989
Work Orders	870	349	167
Service Charges		243	

<u>PRINCIPAL WORK ORDER LOAD</u>	<u>Incomplete June 30, 1956</u>	<u>Incomplete July 31, 1956</u>
Laundry Trays	39	25
Kitchen Cabinet Linoleum	5	38
Kitchen Floor Linoleum	15	7
Bathroom Tile	4	3
Shower Stalls	2	3

ALTERATION PERMITS ISSUED - MONTH OF JULY 81
June 83

Patio	6	Air Conditioners	20
Automatic Washer & Dryer	7	Dishwasher	1
Water Softener	2	Concrete Retaining Wall	3
Service Building	1	Remove Cupboards	1
Fence	6	Dryer	5
Basement Excavation	1	Oil Burner	3
Toilet Stool & Washbasin	1	Automatic Washer	7
Widen Porch; Install Iron Rail	1	TV Antenna	15
Basement Partitions	2	Electrical Wiring	1
Basement Partition & Ceiling	1	Basement Shelves	1
Concrete Sidewalk	2	Move Laundry Trays	2
Tool Shed	1	Back Door	5
Outside Light	1	Kitchen Outlet	1
Exterior Paint	1	Cabinet	1
Picture Window	1	Stocker	1
Dishwasher & Garbage Disposal	1	Closets	1

<u>INSPECTIONS FOR MONTH OF JULY</u>	567
June	826

Floor Linoleum	39	Sink Top Linoleum	44
Laundry Trays	4	Steps	3
Sinks	2	Toilet Stool	1
Jack and Shim	3	Walls	4
Ceilings	2	Windows	1

INSPECTIONS FOR MONTH OF JULY - Continued

Floors	2	Porch	2
Cancellations	106	Shows	105
Renovation	99	Served Quits & Vacate	50
Dormitories	100		

TENANT STORES

<u>MERCHANDISE ISSUED</u>	<u>TOTAL AMOUNT</u>
Shades	352
Reflector	50
Ice Cube Trays	53
Meat Tenders	9
Drip Trays	8
Hydrators Glasses	6
SC Drip Pans	6
Door Stops	8
Cooker Pots & Lids	2
Furniture Delivery	24
Furniture Recall	18
Grass Seed Per Lb.	25
Furnace Stocker	3

RECALL AND DELIVERY OF RANGES AND REFERS MONTH OF JULY

	<u>Delivery</u>		<u>Recalled</u>	
	<u>Ranges</u>	<u>Refers</u>	<u>Ranges</u>	<u>Refers</u>
A	2 SC	2 TA	2 SC	4 TA
B	4 SC	4 TA	3 SC	10 TA
F	2 SC			1 TA
H		1 TA	1 SC	1 TA
Q		1 HEW		
V	1 HEW	1 HEW		4 HEW
Y	2 HEW	3 HEW		2 HEW
1/BR	1 SC		1 SC	
2/BR	2 SC		2 SC	
3/BR	1 SC	1 TA	3 SC	3 TA
Geo. Wash. Way Apt.	1 SC		1 SC	
TOTAL	16	13	13	25

<u>Ranges in Warehouse</u>		<u>Refers in Warehouse</u>	
SC	26	TA	14
Frigadaire	1	GM	1
GE	4	GM	1
		GE	2

COMMERCIAL & RESIDENTIAL PROPERTY UNIT
RESIDENTIAL LEASES

JULY 1956

DORMITORY REPORT

	<u>Beds Available</u>	<u>Vacant Beds</u>	<u>Occupied Beds</u>
Men	399	76	323
Women	305*	113**	192*
Total	704*	189**	515*

*This includes 2 beds used for Dormitory Offices.

**This includes 33 beds vacant in Dormitory M 13.

Waiting Lists:

	Single Rooms	Double Rooms
Men	0	0
Women	0	0

The following Dormitories are in stand-by condition:

W 11--38 Beds W-12- 38 Beds M 6--39 Beds
M 7- 39 Beds M 8- 39 Beds

Total Beds: 193

Dormitories released for temporary office use:

W 15- 50 Beds W 16--50 Beds W 21- 50 Beds
W 17--50 Beds

Total Beds: 200

RESIDENTIAL LEASING

<u>CANCELLATIONS</u>		<u>ALLOCATIONS</u>	
Voluntary terminations	25	New tenants	68
Transfers	9	Moves (within Richland)	35
Move off Project	27	Turnovers	8
R.O.F.	4	Total	111
Military Service	1		
Marriage	2	Houses on which leases were	
Moves	35	cancelled "Ready to Rent"	88
Retirement	3		
Divorce	2	Houses on which leases were	
Not Eligible	4	cancelled sent to "Renovation	19
Turnovers			
Marriage	4	Number persons on Master List	413
Army	1	Number names on Move List	6259
Roommate	1		
Deceased	1		
Divorce	1		
Total	120		

RICHLAND HOUSING

HOUSING UTILIZATION AS OF MONTH ENDING JULY 31, 1956
HOUSES OCCUPIED BY FAMILY GROUPS

	Conven.	A&J	T	Pre Cut	Ranch	Pre Fab	Dorm Apt.	A&J Apt.	2BR Apt.	4th Hsg.	Tract	Total
G. E.	2221	268	10	402	891	1124	7	55	60	204	23	5265
Comm. Fac.	99	18		23	46	54		5	3	9	2	259
AEC	66	25		14	33	25	3	2	5	9	2	184
Other Gov't.	10	4		1	3	2					1	21
Post Office	10				2	8					1	21
Schools	68			5	12	38			1	1		125
Comm. Act.	10			1	6	4				1		22
Med. Fac.	3	15			1	2				3		24
J. A. Jones	3	3			3	1						10
Minor Const.						1						1
Not Cert.	3			2	2	1						8
Total	2493	333	10	448	999	1260	10	62	69	227	29	5940
Ready to Rent	5					14		1	1	3	1	25
In Renovation	2			2	1	2		1				8
Boarded Up											3	3
Total	2500	333	10	450	1000	1276	10	64	70	230	33	5976

	Begin Month	Moved In	Moved Out	End of Month	Difference
Conventional	2488	48	-43	2493	5
A&J	333	5	-5	333	0
T	10	0	-0	10	0
Pre-cut	450	6	-8	448	-2
Ranch	1000	10	-11	999	-1
Prefab	1272	35	-47	1260	-12
Dorm Apts.	10	0	-0	10	0
A&J Apts.	63	3	-4	62	-1
2BR Apts.	68	1	-0	69	1
4th Hsg.	230	1	-4	227	-3
Tract	29	0	-0	29	0
Total	5953	109	-122	5940	-13

COMMUNITY SECTION

RICHLAND FIRE DEPARTMENT

MONTHLY REPORT

July 1956

<u>ORGANIZATION AND PERSONNEL</u>	<u>EXEMPT</u>	<u>NON-EXEMPT</u>
Employees - Beginning of Month	17	31
Transfers In	0	1
Transfers Out	0	0
Terminations	0	0
New Hires	0	0
End of Month	17	32

FIRE PROTECTION

Fire Loss (Estimated): Government	\$ 0.00
Personal	20.00
July Total	\$ 20.00
1956 Total	\$84,937.45

Response to Fire Alarms	21
Ambulance Responses	16
Inside Schools or Drills	14
Outside Drills	2
Safety Meetings	8
Security Meetings	4
Alarm Boxes Tested	209

Engine companies utilized 405 manhours during July on residential inspections, completing 1138 inspections for a total this year of 3186. July inspections revealed 813 reportable hazards. A total of 745 'not at home' reports were turned in.

The 250 feet of new 3½ inch fire hose received on July 2nd was pressure tested on July 3rd and is now in service on Engine 5.

Fire apparatus was dispatched July 8th and 17th to stand by at the A.E.C. Airport during the landing and take-off of military transport planes.

Captain Hatfield gave a refresher course in artificial respiration on July 11th for the Richland Swimming Pool lifeguards.

On July 17th firemen entertained 62 juvenile participants in the "Name the Dog" Contest at the Central Fire Station with 21 adults accompanying the youngsters.

Fire Department participation in the July 20th Civil Defense exercises consisted of dispersal of fire apparatus and ambulances.

A new program of pre-fire surveys of all commercial and public buildings in Richland was inaugurated on July 23rd by engine company personnel. By charting the structure and noting hazardous conditions, personnel will have available a record of each building for study purposes.

A total of 277 buildings were inspected, resulting in 39 hazard reports being submitted. A total of 240 fire extinguishers were inspected, 4 installed and 2 defective extinguishers were removed for servicing.

A total of 29 sprinkler systems were inspected and 3 new systems were installed by contractor in the Columbia High School.

Lectured to 23 employees of Housing Unit on city-wide fire prevention campaign.

Prepared a narrative of Richland's Fire Prevention activities for publication in Everywoman's Magazine at request of the editor.

Assisted with preparations for a party for all children participating in the "Name the Dog Contest". Merchants graciously provided the prizes for the 62 children attending party.

Surveyed Civil Defense trailers for Fire Protection Equipment and provided 3 extinguishers for each.

Made follow-up of repairs to The Mart following recent fire. Some of the structural repairs made by the insurance company were not in the interest of good fire safety and efforts are being made to get needed corrections.

Sprinkler system at Jason Lee School was removed from service as result of a false fire alarm until contractor performs adjustment to system.

Inspected zirconium storage at Central Stores with Technical and Stores personnel to learn the hazards of this metal.

Conferred with Design Engineers on sizes of water service and meters required for providing sufficient flow for fire hose and sprinkler systems in buildings.

Participated in a new inspection program by accompanying fire truck companies on inspection of commercial buildings. Hazards and pre-fire planning are studied during the tours with sketches prepared on the spot for use in training classes.

COMMUNITY SECTION
RICHLAND ELECTRICAL UNIT
MONTHLY REPORT
JULY 1956

ORGANIZATION AND PERSONNEL

	<u>Exempt</u>	<u>Non-Exempt</u>
Employees Beginning of Month	4	16
Transfers In		
Transfers Out		
Total End of Month	4	16

SYSTEM MAINTENANCE AND OPERATION

Outside Lines

Poles set	15
Poles transferred	14
Anchors and Guys installed	8
Street lights installed	0
Mast arms installed	0
Street lights relamped - 1100 Area	93
Street lights relamped - 700 Area	4
Flood lights relamped - 1100 Area	4
Flood lights relamped - 700 Area	0
Traffic signals relamped	12
Primary line footage added	0
Primary line footage removed	0
Transformer KVA added	603
Transformer KVA removed	477
New services installed	4
Services removed	3
Scheduled outages	3
Unscheduled outages	3
Trees trimmed	144
Stand by and escort	1

TRAFFIC SIGNALS

Operational failures	1
Routine check R.R. Signal at Van Giesen	4
Total signals in operation - automatic	19
Total signals in operation - manual auxiliary	6
Total signals in operation - flasher	3

UTILITIES - ELECTRICAL MAINTENANCE

Electrical motors checked and serviced - irrigation	16
Electrical motors checked and serviced - water	70
Electrical motors checked and serviced - sewage	64

FIRE DEPARTMENT TEST AND MAINTENANCE

Inside circuit and equipment checks	4
Outside circuits checked	5
Inside faults repaired	2
New circuits placed in operation	0
Outside faults repaired	1
New boxes placed in operation	0

SUBSTATIONS

Main feeder breaker checks - BB1S1	4
Main feeder breaker checks - BB1S2	4
Secondary and pad located stations - checked jumpers, cutouts, grounds and general condition	26

METERING - OPERATION, MAINTENANCE, CONSUMPTION AND REVENUE

Voltage and load checks	4
Meters tested - customer's requests	5
New meters shop tested	0
Faulty meters replaced or repaired	1
Damaged meters and covers	1
Residential read-ins	176
Residential read-outs	203
Residential disconnects	2
Residential reconnects	2
Radio interference checks	0
Overloaded meters changed out	1
Routine meter tests	96

Consumption and Revenue for Month of June 1956.

	<u>No. of Meters</u>	<u>KWH</u>	<u>Revenue</u>
Residential - Schedule 1	6,962	4,906,236	\$52,350.26
Commercial - Schedule 2	<u>420</u>	<u>3,467,843</u>	<u>26,706.94</u>
Total	7,382	8,374,079	\$79,057.20

CUSTOMER SERVICES

Perform routine maintenance on traffic signals, fire alarm system, sewage treatment system and water system as required. Installed new light in sewer lift #1 and replaced burned out coils in motor starters at "C" and "K" Wells. Completed the cleaning and testing of fire alarm boxes on circuits #3, 4, & 5. Repaired phone jack in box #812. Installed new underground service to Pasco's 614 Building for Radiation Monitoring Group. Set 20 anchors for boat docks along Columbia River. Removed one mile of telephone pole line.

SUBSTATION AND METER MAINTENANCE

Performed routine transformer and substation maintenance. Overhauled 21 distribution transformers. Changed out 84 Roller Smith watt-hour meters.

OUTSIDE LINES

Started a program of routine overhaul of all aluminum service drops so as to correct poor connections and eliminate corrosion of wires. Completed the painting of poles at end of CAP Airport runway #20.

Note: An accident occurred 7-11-56 prior to the completion of painting of these poles where an airplane struck the wires, breaking them and setting fire to the grass. Damage was repaired and a back charge work order was initiated. It is not known at this time whether or not the insurance group will bill the pilot.

Installed a new 100 KVA bank to provide service to the Lutheran Church addition at Stevens and Van Giesen. The design of this bank has aroused considerable interest in the plant. Pictures have been taken of the structure and it is expected that a design standard will be issued for use on the plant. The contractor removing trees in the rear of 1726 Macomb Place damaged a service drop and meter loop. The damage was repaired and the contractor billed. The contractor installing 30 additional street lights in the south end of town is progressing satisfactorily and it is expected that his work will be completed sometime in August.

CALL OUTS

Five exempt and nine non-exempt men were called out during the month to repair four cases of trouble.

COMMUNITY SECTION
ENGINEERING UNIT
MONTHLY REPORT
JULY 1956

<u>PERSONNEL</u>	<u>Exempt</u>	<u>Non-Exempt</u>	<u>Total</u>
Employees Beginning of Month	2	4	6
Transfers Out	0	0	0
Transfers In	1	0	1
Terminations	0	0	0
Total End of Month	3	4	7

BUILDING PERMITS

1. H. L. Brandt - 1504 Butternut - Garage
2. A. C. Cooper - 637 Chestnut - Carport
3. L. M. Meeker - 1913 Davison - Garage. Recreation room, 2 bedrooms, bath and utility room all in present basement.
4. Al Mihart - 202 Davenport - Porch
5. R. L. Roy - 406 Birch - Carport and Storage Room
6. 1 Sign Permit

NEW MUNICIPAL CONSTRUCTION STARTED

NONE

ENGINEERING JOBS COMPLETED

G-01021 - Lowering of Irrigation Risers

TRANSFERRED TO PROJECT ENGINEERING DEPARTMENT

C-95450 - Replace Lot Line Corner Stakes

STATUS OF ENGINEERING UNIT PROJECTS

G-01020 - Falley Field Improvements - Contract awarded. Contractor started work May 29, 1956. Construction 50% complete.

G-01022 - Development of Riverside Park, Newton to North End of Park - Contract awarded. Contractor started work May 29, 1956. Construction 50% complete.

G-01023 - New Sewage Treatment Plant Road - Construction 50% complete.

G-02205 - Additional Street Lights, Richland, Washington - Contract awarded.
Construction 35% complete.

C-0572 - Study of Drainage Ditch from Swift Blvd. to Origin on Wellsian Way -
Plans to AEC for approval 3-26-56.

BUILDINGS UNDER CONSTRUCTION

Plans, Specs., Inspections, Central U. P. Church (Alternate #1) - 98%
complete. Work progressing as scheduled.

Plans, Specs., Inspections, Richland Lutheran Church - 70% complete. Work
progressing as scheduled. All of rooms may not be completed on this
contract.

Plans, Specs., Inspections, L. G. Cook Building - 95% complete. Portions
of building occupied.

Plans, Specs., Inspections, Parker Hansen Building - 95% complete. Portions
of building now occupied.

Plans, Specs., Inspections, Moore's Service Station - 100% complete. Open
for business.

Plans, Specs., Inspections, Parcell's Bulk Station, Wellsian Way - 95%
complete. No progress this month. Loading dock lacks roof.

Plans, Specs., Inspections, Charles D. McGuinness - 95% complete. Open
for business. Plumbing and roof structure not completed satisfactorily.

Plans, Specs., Inspections, Rice's Rug Service - 80% complete. Addition
being used. No wiring installed in it. Openings in existing walls
not yet enlarged as planned.

Addition to Carmichael Junior High School being supervised by AEC.

COMMUNITY SECTION
PUBLIC WORKS AND RECREATION UNIT
MONTHLY REPORT
JULY 1956

ORGANIZATION AND PERSONNEL

	<u>Exempt</u>	<u>Non-Exempt</u>
Employees Beginning of Month	6	46
Transfers Out	0	0
Transfers In	0	4
New Employees	0	0
Terminations	0	0
Total End of Month	6	50

ROADS AND STREETS

The disposal road (Bradley) was regraded and resurfaced as a result of flood damage. 316 cubic yards of base material and 328 cubic yards of 3/4 minus were required for this work.

That section of Torbett, between Thayer and Perkins, which was damaged extensively by the spring thaws has been regraded and surfaced in preparation for oiling. 77 cubic yards of 3/4 minus was required.

At the Conoco Station on Lee Street the sunken curb and sidewalk has been removed, backfill added in preparation for replacement of curb and sidewalk.

5000 cubic yards of 3/4 minus aggregates were crushed and stockpiled at the Lacey Road material yard this month by the Transportation Section for use by this unit.

The Vail Construction Company is now at work on the Harris extension and that portion under contract.

Continued street patching and maintenance of storm sewers and signs as required.

Materials used this month are as follows:

Blacktop	- 109 tons
3/4 Minus	- 437 cubic yards
Pit Run	- 328 cubic yards

228 curb miles were swept and 117 cubic yards were picked up.

SANITATION

Waste removal during the month required collection and disposal of the following:

Residential:	467 tons
Commercial:	<u>120 tons</u>
Total	587 tons

Garbage was weighed for a period of one week (July 16 through July 21, 1956). This check showed an overestimate on tonnage as reported previously. Another

PUBLIC WORKS AND RECREATION UNIT

SANITATION (Cont'd.)

check will be made in mid-winter.

Elimination of trash trailers has continued until only one (1) remains in use. Arrangements for its removal are now being made.

PARKS AND PUBLIC GROUNDS

Mowing and irrigation of assigned areas continued on a routine basis during this month.

Irrigation of shelterbelts continued during July.

Started Sickle Bar mowing of thistle areas throughout the community on 7-20-56. Areas are heavy with thistle growth due to unseasonal rains late this spring and ideal growing season. This work will continue through the month of August.

Irrigation of lawn areas was a problem during July with water usage at a peak in the community. Lawn irrigation crews were stopped from watering on seven (7) different occasions so that water could be stored for the public's consumption on the following day. This allows for many dry, brown spots on many assigned lawn areas.

Ball Field maintenance, equipment repair, and general maintenance of assigned areas, buildings, and equipment continued during July.

Flood and driftwood cleanup at the northern end of Riverside Park was completed during July.

MOSQUITO CONTROL

During the month of July, the adulticiding program was intensified with the advent of good weather conditions. Good results were obtained as judged by the decrease in mosquito complaints.

Larvaciding was continued on a routine schedule, but has decreased sharply over last month due to the return of the Yakima and Columbia Rivers to their usual channels.

The materials used were: 750 gals. of Diesel Oil, 50 gals. of Xylene, 200 lbs. of D.D.T., and 20 gals. of Lethane "384".

RECREATION

General

The Play-For-Fun League baseball season for boys age 8-12 inclusive concluded its season at Columbia Playfield with the Richland Cubs winning the championship.

The Junior Chamber of Commerce Concession Committee of the Atomic Frontier Days Celebration awarded concessions to the various groups on Wednesday, July 25, at the Community House.

PUBLIC WORKS AND RECREATION UNIT

RECREATION (Cont'd.)

General (Cont'd.)

The Story Telling Hour at Riverside Park under the direction of Marie Golubski, children's librarian, held its first two sessions with approximately 50 in attendance at each session.

The Community Recreation Band under the direction of Gordon Pappas held two (2) concerts at Riverside Park during the month of July.

Special events in the Summer Recreation Program held at Riverside Park during the month included the Baseball Pitch Contest.

A Junior Tennis Clinic was started on a one (1) night a week basis at Columbia Playfield during the month of July.

Seventeen (17) boat dock owners were instructed to vacate the river bank adjacent to Riverside Park in order to comply with the regulations of the U. S. Army Engineer Corps.

Attendance Statistics - July 1956

	<u>No. of Sessions</u>	<u>Youth</u>	<u>Adults</u>	<u>Sub Total</u>
A. <u>Community House</u>				
Arts & Crafts	10	185	10	195
City Council	2		63	63
Colt League	6	2	76	78
Fencing	5		15	15
Games Room	25	710	133	843
Hi-Spot	7	1 043	28	1 071
Int'l Folk Dancers	4	3	52	55
Jr. Chamber of Commerce (AFD Concession Row)	1		46	46
Little Leagues	1		10	10
100 Area Chief Operators	1		5	5
Pony League	1		20	20
Rec-A-Teers	4		227	227
Richland Chess Club	4		22	22
Richland Kennel Club	1		15	15
Richland Rod & Gun Club	2	11	145	156
Social Security	2		75	75
Stamp Club	1		5	5
Total Community House	77	1 954	947	2 901
B. <u>Parks and Playgrounds</u>				
Wellsian Lake	30	1 500	750	2 250
Ball Field Bookings	118	2 010	429	2 439

PUBLIC WORKS AND RECREATION UNIT

Attendance Statistics - July 1956 (Cont'd.)

Parks and Playgrounds (Cont'd.)

	<u>No. of Sessions</u>	<u>Youth</u>	<u>Adults</u>	<u>Sub Total</u>
Memorial Softball Field	20	1 390	2 860	4 250
Picnic Bookings	98	3 420	3 740	7 160
Playlots	30	6 600	3 300	9 900
Triple-O-League	4		720	720
Play-For-Fun League	18	1 040	800	1 840
Jefferson Little League	10	750	1 400	2 150
Jefferson Tournaments	2	1 200	1 800	3 000
Columbia Baseball	22	1 100	2 380	3 480
Riverside Park	20	4 200	2 780	6 980
Columbia Playfield	20	2 684	2 954	5 638
Total Parks & Playgrounds	392	25 894	23 913	49 807

C. Summary

Community House and Parks and Playgrounds total for July 1956	<u>469</u>	<u>27 848</u>	<u>24 860</u>	<u>52 708</u>
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Calendar Year to Date				<u>205 813</u>
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COMMUNITY SECTION
WATER AND SEWERAGE UTILITIES UNIT
MONTHLY REPORT
JULY 1956

ORGANIZATION AND PERSONNEL

	<u>Exempt</u>	<u>Non-Exempt</u>
Employees Beginning of Month	6	27
*Transfers Out	1	0
*Transfers In	0	1
New Employees	0	0
Terminations	0	0
Total End of Month	*6	27

*One Shift Supervisor transferred to Mfg. Reactor. One Junior Power Operator 4715 up-graded to Shift Supervisor. One Junior Power Operator transferred in from Mfg. Reactor.

DOMESTIC WATER

Normal operations and routine maintenance were continued throughout the month.

Water consumption increased considerably during the extreme hot weather. For several days we were unable to maintain adequate pressure's in the highest levels of the system. To improve this condition we requested the School System and the Community Parks group to cut back on the water they were using for irrigating lawns. As a result of the excellent cooperation from these groups we were able to improve on the water pressure's throughout the system.

A record water consumption was made during the month when 924,413,800 gallons of water was consumed. This exceeds a previous record of 855,000,000 which was made in August 1955.

DOMESTIC WATER DATA

	<u>Well Production</u>	<u>Av. Da. Prod.</u>	<u>Total Consumpt.</u>	<u>Av. Da. Cons.</u>
Richland	225,330,000	7,268,700	817,731,800	26,378,400
North Richland	580,390,000	18,722,200	41,878,000	1,350,900
Columbia Field	117,878,800	3,802,500		
300 Area			64,804,000	2,090,400
Total	923,598,800	29,793,400	924,413,800	29,819,700

Maximum daily production 32,358,000 gallons on July 10, 1956

Maximum daily consumption 32,358,800 gallons on July 27, 1956

WATER AND SEWERAGE UTILITIES UNIT

SEWERAGE SYSTEM

Normal operations and routine maintenance work was continued throughout the month.

Overhaul work was commenced on the large hot water boiler at Number 2 Sewage Treatment Plant.

Construction work has commenced on a new roadway into the Treatment Plant.

SEWERAGE DATA

Plant No. 1 Total Flow	50,380,000	Average Daily Flow	1,625,100
Plant No. 2 Total Flow	<u>82,496,000</u>	Average Daily Flow	<u>2,661,100</u>
Total Flow	132,876,000		4,286,200

IRRIGATION SYSTEMS

Normal operations continued throughout the month. Pump repairs have been completed and Number 5 irrigation station has been returned to normal service.

The irrigation canal was treated at the fish screens and the 3000 area trunk line for aquatic weed control during the month.

COMMUNITY SECTION
 RICHLAND PUBLIC LIBRARY
 MONTHLY REPORT
 JULY 1956

<u>ORGANIZATION AND PERSONNEL</u>	<u>EXEMPT</u>	<u>NON-EXEMPT</u>
Employees beginning of month	3	9
Transfers in	0	1
Transfers out	0	0
New hires	1	0
Terminations	0	0
End of month	4	10

GENERAL

Circulation

Books	21,000	
Magazines	450	
Pamphlets	69	
Records	1,093	
Interlibrary Loans	28	
Grand Total		22,640

Current Book Stock

Books added this month	156	
Books withdrawn this month	111	
Grand Total		39,222

Registration

Adult	154	
Juvenile	79	
Juvenile registrations dropped	25	
Net Total	208	
Total registered borrowers		22,262

Meetings in North Hall 5

Children's Story Hour Attendance 219 (4 story hours in Riverside Park)

Mrs. Joan Sherwood joined the Richland Public Library Staff on July 9 as Catalog-Order Librarian.

806 children are registered in the Children's Summer Reading Club. The number of participants in this year's Summer Reading Club exceeds that of any prior year by 223.

Miss Marie Golubski, Children's Librarian, instructed 95 Camp Fire and Blue Bird leaders in the art of story-telling, Tuesday, July 31, at Kiwanis Camp.

Miss Doris Roberts, Librarian, participated in the program of the Washington Library Association Workshop at the University of Washington on July 12-13.

An exhibit of the paintings of Mr. Guernsey Ford has been in North Hall this month. The exhibit is sponsored by the Allied Arts Association.

AUXILIARY OPERATIONS AND PLANT PROTECTION SECTION

MONTHLY REPORT - JULY 1956

ORGANIZATION AND PERSONNEL

Number of employees and payroll:

	<u>Beginning of Month</u>	<u>End of Month</u>	<u>Increase</u>	<u>Decrease</u>
Staff	2	2		
Administration Area Maintenance	104	104		
Security and Patrol	472	468		4 (a)
Fire Protection	126	128	2 (b)	
Office Auxiliaries	127	121		6 (c)
Telephone	80	80 (d)		
	<hr/>	<hr/>	<hr/>	<hr/>
TOTALS	911	903	2	10

NET DECREASE: 8

(a) - Security and Patrol

1 Reactivated
1 Transferred out
1 Deactivated
3 Terminations

(b) - Fire Protection

2 New Hires

(c) - Office Auxiliaries

15 New Hires
20 Transferred out
1 Termination

(d) - Telephone

1 New Hire
1 Transferred in
1 Transferred out
1 Termination

FIRE PROTECTION UNIT

Fire Responses

HAPO	7	Loss	\$ 20.00
Outer Areas	2	Loss	-0-
Construction	2	Loss (Private)	150.00
U. S. Army	1	Loss	-0-
Private (Auto)	1	Loss (Private)	100.00

Description of Fires

Private Automobile, 200-West Area, Time 8:31 AM, 7/6/56

Responded to a telephone alarm from Patrol of a fire in the rear seat cushions of a car in 200-West parking area. Fire extinguished by use of dry chemical by Patrol and water by Fire Department. Probably caused by smoking material discarded by passengers. Loss approximately \$100.00.

Manufacturing, Electrical Utility, Line Maintenance, 200-East, Time 7:50 AM, 7/7/56

Faulty switch, located on pole C8X38 west of the TC-4 Building, caused an arc, fusing hot material, which in turn dropped and ignited grass. No loss.

Manufacturing, Separations, Analytical Control, 200-East, Time 12:38 AM, 7/12/56

Trouble in alarm system at the 202-A Building actuated Box #12. After complete check of the building, with no evidence of fire, alarm system was restored to normal. No fire, no loss.

Engineering, Minor Projects, Minor Construction, White Bluffs, Time 9:45 AM, 7/12/56

A Minor Construction worker stopped at the Fire Station to report a previous fire in the flat bed truck (MC68B-8911) which he was driving. He stated that fire was caused by ignition of rope contacting exhaust pipe. Fire extended to rack and truck bed causing minor damage. Fire was out upon arrival at station. Loss \$10.00.

Engineering, Pile Technology, Fuel Assembly, 300 Area, Time 10:50 AM, 7/12/56

Spontaneous ignition of uranium chips in a metal barrel S.E. of the 306 Building. Burning material isolated and allowed to burn itself out. No loss.

Outer Area, Approximately 5 Miles West of Midway, Time 11:30 AM, 7/15/56

Grass fire five miles west of Midway reported through 100-B operator. Response made to check any danger to plant. Equipment returned when it was determined that fire was controlled by Bonneville Fire Department. No loss.

Engineering, Minor Construction, Field Office Unit, 100-B Area, Time 11:17 AM, 7/17/56

Circuits of fire alarm detector system, 1703-B Building were cut by contractor before Minor Construction has given consent. System transmitted alarm from Box #61. No fire, no loss..

Manufacturing, Reactor, 100-KW Operations, 100-K Area, Time 12:57 AM, 7/17/56

During revision work in the 1704-B Building, Room 31, a welders spark lodged in a crevice of the ceiling, igniting wall and ceiling covering. Fire was extinguished by employees using extinguishers prior to arrival of the Fire Department. Loss \$10.00.

U. S. Army, West of Burning Pit, Outer Area, Time 10:17 AM, 7/20/56

Controlled burning in pit by U. S. Army at PSN-21 spread beyond control zone when burned paper was carried by wind. Fire department extinguished burning pit fire and assisted in extinguishment of grass fire. No loss.

East of Midway Housing Area, Time 7:04 PM, 7/21/56

Grass fire near Midway was probably caused by discarded smoking material. Responded to telephone alarm from Bonneville Power Operation. Upon arrival found fire had been extinguished by local residents. No loss.

Manufacturing, Reactor, Operations, 100-H Area, Time 11:39 AM, 7/22/56

Responded to a call for assistance in control of nitric acid spill at 105-H, south side. Pipe outlet on drum was dissolved by acid, causing acid spill. Applied water from 2½ inch fog nozzle to neutralize fumes. No fire, no loss.

AEC, Hoffman Construction Company, 200-West, Time 11:25 AM, 7/23/56

A welding employee of Thorn & Marble was using a torch to cut a hand rail on the roof of the 224-UA Building. Hot slag fell into and ignited trash at the base of the building. Fire department extinguished fire with water from booster tank. Exterior wall of building was scorched and requires refinishing. Private loss \$125.00.

AEC Construction, Morrison-Knudsen Inc., 100-F Area, Time 2:46 PM, 7/31/56

Responded to a telephone alarm of a fire at South side of 190-F, 100-F Area. Upon arrival found welder's spark had ignited protective tarpaulin. Construction employees had extinguished fire prior to arrival of Fire Department by use of small water hose. Private loss \$25.00.

Drills Held During July

Outside drills held	120
Inside drills held	106

A class on artificial respiration was conducted at the 222-S Building, 200-West Area, with 18 plant employees in attendance.

Several small buildings in the 300 Area and an old ice house at 200-West Area were disposed of by the Fire Protection Unit during July.

The Fire Department assisted in the controlled burning of the 100-F burning pit on July 16.

The Fire Department assisted 100-K Area in disposal of contaminated waste by burning on July 16.

Assisted during processing difficulties at 105-H Area by supplying a 750 GPM pumper for 24 hours on July 23.

Fire Department participated in the plant evacuation drill on July 20 with the Chief's car and a tanker truck.

30,290 feet of fire hose and 747 feet of ladders were used for drill purposes during July.

Fire Extinguishers

Inspected	1640
Installed	15
Delivered to new locations	0
Seals Broken	26
Serviced	193
Weighed	289

Gas Masks

Inspected	62
Serviced	2
Hand lines inspected	118
Hose Boxes inspected	10

OFFICE AUXILIARIES SUB-SECTION

Plant Mail Unit

Internal and postal mail remained normal during the past period by volume; however the weight load increased due to increased library activity on inter-office mail. Special assignments were numerous and included a distribution of a booklet "May We Suggest", for the Suggestion System, and three booklets for Public Health. All were distributed to all employees. The usual publications from Schenectady and fifty-two distributions were made to HAPO management via Addressograph.

The addressograph work was heavy during the past period and the collator was operated approximately ninety hours during the past period.

<u>Types and Pieces of Mail Handled</u>	<u>June</u>	<u>July</u>
Internal	5,361,749	2,963,699
Postal	110,367	59,653
Special	2,668	1,076
Registered	10,273	8,059
	<hr/>	<hr/>
	5,485,057	3,032,487
Total Postage Used	\$4,455.60	\$1,799.63
Total Teletypes Handled	3,018	1,665
Total Store Orders Handles	720	396

<u>Addressograph</u>	<u>Number of Total</u>		<u>Number of Total</u>	
	<u>Runs</u>	<u>Copies</u>	<u>Runs</u>	<u>Copies</u>
Plate name list	143	187,197	121	172,341
Housing list	26	55,017	18	43,185
Payroll list	7	11,921	3	4,261
Total new plates	5,161		3,131	
Total corrected plates	6,382		4,186	
Machine Collating (sheets)	221,430		164,011	

Printing Unit

During the month, figures, halftones, graphs and charts were printed for inclusion into twenty-nine different formal documents.

One Top Secret order was printed for AEC.

The booklet "May We Suggest" was completed to meet target date. This job required considerable special operations, such as solid area color printing on two sides, cutting and trimming, folding, gathering, and stapling.

<u>Work Completed</u>	<u>June</u>	<u>July</u>
Orders received	468	228
Orders completed	453	244
Average Orders on hand	69.8	56.8
Copies Printed	868,935	437,946
Vacuum Frame Plated Masked	707	305
Negatives Processed	1,055	383
Photo Copy Prepared	272	294
Litho Plates Processed	683	373

Stenographic Unit

One Stenographer and twelve Stenographer-Typists were assigned to the Unit in July. Sixteen transfers were effected to other plant units and forty loan assignments were made.

The work load was consistently heavy throughout the month; however, work is current at month's end. Larger assignments included typing of three training programs for Education and Training Section, assistance to Plant Mail in preparation of plant-wide mailing of material for Employee Benefits, duplimat typing of "Union Relations Interpretation and Application of the GE-HAMTC Agreement", and Equipment Data Card file for 100-B Reactor Maintenance.

	<u>June</u>	<u>July</u>
Total Production Hours	3,120	2,197.5
Training Hours	100	157
Unassigned Hours	139	77.5
Meeting Hours	8	4
Holiday Hours	48	64
Absentee Hours (with pay)	16	0
	<hr/>	<hr/>
	3,431.5	2,500

Office Equipment Unit

Office Furniture

The expendable office furniture account No. 93 was valued at \$15,377 on June 30, 1956 or an average of 5.3 months' supply on hand.

Office Furniture (Continued)

A total of 89 service orders and three work orders were issued for repair, assembly, and maintenance of furniture. There were 421 debit and credit store orders processed during the month, or an average of 20 per working day.

The new gray metal furniture purchased for 306 Building was delivered during the month. This building is now equipped with gray furniture similar to other laboratory buildings.

The following is a detail by quantity of pieces of furniture handled during the month:

	<u>Inter-Plant</u>		<u>Off Plant</u>		<u>Salvage</u>
	<u>Issued</u>	<u>Rec'd</u>	<u>Issued</u>	<u>Rec'd</u>	
Blackboard	5	0	0	0	0
Bookcase	8	0	0	0	0
Costumer	15	4	0	0	0
Card File	0	1	0	0	0
Cabinet	45	40	0	0	0
Chairs	161	139	0	266	0
Daveno	4	2	0	0	0
Desks	67	26	0	0	0
Tables	48	25	0	60	0
Miscellaneous	267	39	0	180	0
	<u>620</u>	<u>277</u>	<u>0</u>	<u>506</u>	<u>0</u>

Office Machines

A total of 4,213 machines were in service and stock on June 20, 1956. A total of 34 machines were transferred to Stores in excess during the month making a net reduction of 20 machines from previous month's balance.

The annual physical self inventory check by custodian of machines has been completed and reconciliation to master resulted in 12 machines not accounted for at this date. Further checks are being made before issuing a complete report.

Fifty-two electric typewriters have been received on FY-56 replacement budgets. These machines have been issued and replacement machines are being prepared for transfer to Stores Excess.

One ditto machine was removed from service during the month.

Repair tickets processed:	<u>June</u>	<u>July</u>
	546	500

During the month 14 new Remington electric typewriters were received and checked out for service by a Remington representative.

Office Machines (Continued)

One Ozalid printing machine was received and installed in the 300 Area. This machine was checked for proper operation by a representative of the Ozalid Company. Maintenance instruction was also given to two Office Machine Repair mechanics.

A maintenance representative from Friden Calculator Company visited the Office Machine Repair Shop for one day during the month. While here he briefed mechanics on the latest changes to Friden equipment.

During the month, the Finance Department made a change in the 700 Area west gate clock alley. A larger alley was installed which called for one additional time attendance recorder. A complete changeover from the old alley to the new was effected in one day.

Duplicating Unit

A total of 633,842 copies were reproduced in all duplicating offices during the period reported, as compared with 1,416,509 copies for the period ending June 30. This reduction of 782,667 copies is due to an extended cut-off date for June to coincide with the end of Fiscal Year 1956.

	<u>June</u>	<u>July</u>
Orders Received	4,742	2,337
Orders Completed	4,728	2,311
Orders on Hand	154	1,324
Offset Plates	20,647	11,077
Offset Copies	1,392,419	621,719
Verifax Masters	5,141	2,791
Verifax Copies	18,208	10,619
Ditto Masters	261	138
Ditto copies	4,578	1,239
Embosograf Masters	24	8
Embosograf Copies	173	39
Xerox Plates	2,947	1,179
Copies Duplicated	1,419,456	635,021

ADMINISTRATION AREA MAINTENANCE SUB-SECTION

The remodeling of a 35' trailer to provide a mobile "Operation Emergency Relocation Center" was completed on July 16 and the trailer was delivered to the Civil Defense Coordinator for a test run on July 17.

Siren No. 1 located at the southern end of Thayer Drive failed to operate on "Evacuation" signal at 8:30 on July 20, which was the beginning of local activities in conjunction with the nation-wide "Operation Alert, 1956". The failure was due to malfunction of the throttle solenoid, and the alternate signal, a steady blast of the 700 Area steam plant whistle, was sounded at 8:30 AM. Repairs to siren No. 1 were completed within 30 minutes and the "Take Cover" signal was sounded on all three sirens at 9:15 AM.

Administration Area Maintenance Sub-Section (Continued)

Personnel of the 700 Area participated in "Operation Alert, 1956" by evacuating to their respective parking lots at the evacuation signal, and all employees except those engaged in essential operations and maintenance cleared the area in five minutes despite a momentary delay caused by unfamiliarity with the alternate signal. The first shut down of the steam plant in accordance with evacuation plans was also carried out at this same time and the results indicated that the procedure is practical and safe.

Building 722-Z, the former time clock building for the 700-B Area on Knight Street, was moved to the 700 Area west gate as a replacement for the smaller time clock building 701-C. This newer building is equipped with two time clocks, one more than the former building, and has expedited the clearing through of employees at shift change.

A Property Disposal Report has been issued for the removal of the replaced building 701-C and Building 770-F, the deactivated bus dispatch shack on Cullum Avenue.

Twelve office moves were made within the 700 Area during the month.

Building and Equipment Maintenance

Six one-ton air conditioners received for the animal farm were intercepted and temporarily installed in the EDPM room at Building 713 as an expedient to hold humidity within the operational limits of the computing equipment. The installed de-humidifying equipment has been incapable of satisfactorily performing its intended function and an engineering study is now in process to determine additional equipment requirements.

Acoustical tile was applied to the ceilings of nine offices on the second floor, fifth wing of Building 703, and this completes the coverage of all ceilings in this section of 703 Building.

Biennial major overhaul of No. 1 boiler at 784 is in process and is now 30% complete. This is the second of two boilers scheduled for major work this year, No. 3 having been completed in June.

A fire detection system comprising 103 heat sensitive heads connected to the city Gamewell Alarm circuit was installed in W-17 for protection of records stored in this building.

Extensive remodeling of a semi-trailer is in progress to provide a mobile transformer oil reclaiming unit for Electrical Utility Section, and a parade float is being constructed at request of the Public Communications Unit for use in Atomic Frontier Days.

Inspection and repair of 75 steam relief valves was completed for Community Section.

Condensate type steam meters were installed at Western Union Telegraph office and at the Animal House of Kadlec Hospital, and the steam meter at the Mart which had been damaged during a fire was reconnected.

Building and Equipment Maintenance (Continued)

Frame partitions measuring 39 lineal feet were built in Building 723 to provide a filming studio for Audio-Visual Unit.

Cycle painting completed this month included 24 offices in the front wing of 760 and the ladies room of 723.

Twenty convenience outlets were converted to the new ASA standard - five in 760, five in 717-A and ten in 703.

Guards were fabricated and installed on five fans and 20 file cabinets were secured to prevent tipping.

Miscellaneous work completed in the 700 Area included: assembly of 15 sections of shelving at 760 blueprint room; repair of two centrifuges at 747 and a photostat machine at 760; replanking of a section of the floor in the wooden water tank at 784 to eliminate leaks; application of rubber tile on both stairway landings in fourth wing of 703; installation of an additional air cooler at 729 and a larger capacity replacement cooler at 760; renewal of air cooler pads at W-16, W-21, 717, 722-A, 722-N, 770, 770-A, B and C; installation of four receptacle circuits, two exhaust fans, and one buzzer system; and monthly inspection of all building fire alarm systems.

The following items were performed for Transportation Section: completion of the seasonal overhaul of 1171 furnaces which included replacement of control wiring; painting of seven rooms at 1171; installation of a pressure tank, rough-in plumbing and water line at the White Bluffs Roads Crew Building; overhaul of six welding machines and four portable light plants; hanging of plywood sun screens on eleven windows at 1170; construction and painting of side and tail gates for a semi-trailer; repair of electric range at 1170; installation of lights on four grinding machines; and relamping of 1170 and 1171.

At Central Stores the following services were completed: Repair of roof and side walls of Warehouse 15; siding repair on Warehouses 13, 14, 15 and 24; replacement of deteriorated planking on excess yard docks; installation of six vapor proof lamps; daily battery service and necessary repairs on battery operated lift trucks and tractors; and periodic relamping.

Routine maintenance was continued on buildings and equipment in the 600, 700, Central Stores and Transportation shops areas, and locksmith and glazing service was furnished for all areas.

Building Services

Windows of Buildings 744 and 747 were washed on the exterior and interior.

Tank washing of all venetian blinds in the fifth wing of 703 was completed this month.

Color-seal was applied to concrete floors of seven restrooms in Buildings 761 and 762.

Building Services (Continued)

Routine janitorial service and relamping was continued per schedule in all 700 Area Buildings, Central Stores and Buildings 1170 and 1171 of the Transportation Section.

Steam Operation

No. 2 boiler was in operation the entire month with Nos. 3 and 4 in reserve.

Major work on No. 1 boiler is in progress, 12 tubes have been replaced.

The quantity of steam generated was approximately 10.5% less than for the same period the previous year. 368 tons of coal were received from Richland Fuel and Lumber Company. These deliveries were scheduled to coincide with the coal miners' holiday. This saved the expense of using a bulldozer on our storage pile.

One load of sulphuric acid was sent to 300 Area.

A new oiler was made and installed on air compressor.

A new valve was installed on steam line at Richland Theater so steam can be shut off. A by-pass valve was installed at Carnation Milk Depot so steam pressure can be bled off, thereby saving two or three hours each time repairs are necessary.

Leaking valves were replaced on line leading to Hangar and in steampit by M-13 Dormitory. Leaking trap was also replaced in steampit by M-13.

In conjunction with practice evacuation, No. 2 boiler was actually shut down. Everything was watched closely and record was made at 5-minute intervals on steam pressure, boiler feed water pressure, water level, and load recorded on Bailey Meter. Test showed this type of shut down could be performed without danger or damage to personnel or equipment.

Coal Consumed:	441.75 Tons
Steam generated:	6,290.7 M. Lbs.
Steam leaving plant:	5,294.5 M. Lbs.
Steam delivered:	3,062.5 M. Lbs.

Total water softened:	977,900 Gallons
Total soft water sent to hospital:	20,280 Gallons
Total soft water sent to 784 Building:	957,620 Gallons

TELEPHONE SUB-SECTION

General

The telephone property valuation appraisal being made by R. W. Beck and Associates of Seattle was completed July 23.

Overtime worked during the month was 64% of the amount previously estimated for budget purposes.

Telephone Sub-Section - General (Continued)

Telephone Sub-Section personnel activated the mobile Civil Defense Communications Center at Whitstran on July 20, participated in the Civil Defense exercises and provided to the Engineering Department information on how service would be restored following the theoretically damaged cables.

A contract for furnishing and installing a 51-pair cable between the White Bluffs exchange and the 100-H area was awarded by the Atomic Energy Commission to the Mattoon Company of Oswego, Oregon.

Plant Telephone Operations

Installed a 15-line PAX system in the 770-A and 770-B Buildings for the Employee Communications and Public Relations Section.

Rearranged the telephone system in the mobile Civil Defense Communications Unit, CD-1, to provide cable connection with the new Civil Defense trailer, No. CD-2, in order that telephones in the latter unit could be serving from the PBX board in the CD-1 unit.

Installed 10 gas pressure alarm receivers in the BY telephone exchange.

Installed new number cards containing Fire and Security Patrol emergency telephone numbers on all telephones in the 100-K and 100-BC areas.

Installed an 11-pair cable terminal on the T-1 trunk cable in the vicinity of North Richland to provide a means of extending a telephone circuit to a nearby Community Booster Pump Station.

Replaced a defective 16-pair cable terminal which served the 108-F Building.

Located and cleared a moisture fault in the trunk cable between BY and White Bluffs.

Relocated storage facilities at the BY exchange for the purpose of occupying the new metal building recently completed.

Cut off a 26-pair cable which formerly served the 1703-B Building because of building being moved to the 100-H area.

The trunk cable between BY and White Bluffs had been placed under gas pressure and is being observed for possible sheath leaks.

Routine maintenance of PBX and PAX systems serving the 202-A, 202-S, 271-T, and 234-5 Buildings required 112 manhours.

Conducted a previously initiated traffic study in the 700 Area plant exchange to determine if existing intra-office trunk is distributing the office traffic evenly.

At the request of Stores Sub-Section, stock level and the 12-months disbursement of telephone items were reviewed and recommendations made relative to maintaining or reducing present stock levels.

Commercial Telephone Operations

Located and repaired three small sheath punctures in the Pasco trunk cable.

Located and repaired a case of trouble in Cable 7 near Delafield and Benham.

Installed five new cable terminals in conjunction with a Community pole change-out and relocation program.

Prepared job specification and drawings covering installation of terminal equipment in the attic of the Kadlec Hospital to permit replacement of an existing floor type distributing frame. The job also covers addition of alarm-type fusing to the switchboard itself.

Prepared a job specification for removal of open wire circuits and poles along Kadlec and McMurray Roads. Retirement of these items was prompted by the fact that there are no longer any subscribers in that vicinity and that several of the poles were badly rotted. The work has been completed by the Richland Electrical Unit.

Conducted a spot check of the poles supporting the Pasco and Kennewick trunk cables, taking core samples to determine condition. It was found that one pole in the Pasco line needed replacing and at another location a pole needed to be added to provide required clearance for new farming operations.

Conducted a traffic study on the three lines serving the National Bank of Commerce to determine the number of lost calls resulting from all lines being simultaneously busy.

Radio System Operations

On July 11, 1956, Radio Maintenance personnel temporarily installed sound equipment in the Carmichael School Cafeteria for a meeting of General Electric technical personnel.

Installed a paging system in the Bus Dispatcher's office in the 1170 Building.

Radio Maintenance personnel assisted the Audio-Visual Unit in making a sound film recording in the Richland Library.

On July 20 all Radio Maintenance personnel participated in the Civil Defense drill by setting up radio communication equipment at the Whitstran Staging Area and by operating a mobile repeater station on Rattlesnake Mountain.

Removed seven mobile radio sets from automotive vehicles and installed eight mobile radio sets in other vehicles.

Shop serviced 28 mobile receivers, 31 mobile transmitters, three fixed station receivers, three fixed station transmitters, three intercom units, three audio-amplifiers, two radi remote control units, one radio receiver and two record players.

Field serviced 67 mobile radio sets and seven fixed station units.

Radio Station KKE 624 No. 13 was out of service from 5:55 PM to 8:19 PM on July 24 due to tube failure.

Radio System Operations (Continued)

Radio Station KKE 624 No. 15 was out of service from 11:00 PM July 27 to 9:20 AM July 30 due to tube failure. The trouble was reported to the Radio Maintenance Unit at 8:00 AM July 30.

Statistical Data - 20th of July

	<u>At 20th of July</u>	<u>Change From Previous Month</u>	<u>Change from Year Ago</u>
Residential Subscribers	6197	- 39	/ 491
Business Subscribers	409	- 5	- 50
Paystations (North Richland)	13	- 3	- 3
Paystations (Richland)	50	Same	- 15
Official Subscribers:			
Richland Exchange	232	/ 2	- 12
700-1100 Areas	942	/ 3	/ 75
Process Areas Exchanges	1668	- 3	/ 59
		<hr/>	<hr/>
		- 45	/ 545
New Service Requests Received during the Month:			
For residential service		86	
For Business service		5	
		<hr/>	
	TOTAL	91	
Service Orders Processed:			
In connection with business & residential service		520	
In connection with plant service		130	
		<hr/>	
	TOTAL	650	

Telephone Facilities - Installed, In Service and Available

	<u>Exchange Lines</u>			<u>Unassigned Party Lines</u>
	<u>Installed</u>	<u>In Service</u>	<u>Unassigned</u>	
North Richland	600	13	587	
Richland Community	4022	3712	310	935
700-1100 Areas	1230	924	306	
Process Areas	2050	1660	390	
	<hr/>	<hr/>	<hr/>	<hr/>
	7902	6309	1593	935

Radio Stations - In Service

	<u>At 20th of July</u>	<u>Change from Previous Month</u>	<u>Change from Year Ago</u>
Fixed Stations	34	0	0
Mobile Stations	161	0	/ 8
	<hr/>	<hr/>	<hr/>
	195	0	/ 8

SECURITY AND PATROL SUB-SECTION

Document Report

Number of classified documents and prints unaccounted for as of July 1: 288
(96 of the above 288 documents are chargeable to the du Pont Company)

Number of classified documents and prints reported as unaccounted for during July: 0

Number of classified documents and prints either recovered or downgraded in classification during July: 0

Number of classified documents and prints remaining unaccounted for as of August 1: 288

The Non-Technical Document Review Board held one meeting during July and reviewed a total of 46 documents. Of this number -

2 had their classification retained and
44 were declassified.

Security Education

Six security items appeared in the GE NEWS during the month.

There were 385 security meetings held and attended by 5,115 HAPO employees. A representative of the Plant Protection Services Unit showed one of the security films at some of these meetings or presented the tape recording of Ronald Reagan's lecture at Hanford as indicated below:

<u>Film Title</u>	<u>No. of Meetings</u>	<u>Average Attendance</u>	<u>Total</u>
In Any Direction	8	26	208
The Living Contract	1	14	14
Handle With Care	6	19	114
Turn Left Across the Bridge	2	24	48
Words Are Weapons	1	13	13
Signal 99	1	15	15
Only the River	1	12	12
Ronald Reagan's Lecture on "Communism in Hollywood"	8	42	336

650 copies of the security poster with the slogan "Tomorrow's silhouette...Defense and Power...if secure today" were posted in the plant areas during the month.

2,000 copies of the "A-B-C" type pamphlet with the slogan "Bingo! Check one! Check two! Check thr- - - ooops! A 'locked cabinet' with an open drawer is not a locked cabinet" were distributed to employees during July.

A security mobile with the following slogan "It Isn't a Safe--Until you Lock It" was hung in each of the area badge houses during July, as well as in 700 Area.

Security Education (Continued)

One hundred and thirty-two employees of the Company received a "Q" security orientation talk from either a representative of the Plant Protection Services Unit or a Patrol Supervisor, and seven 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	96	32	82	11	44	0	0	3
Escorts	9	24	30	43	13	100	127	6
Ambulance Runs	0	7	2	4	1	1	2	6
Passes issued:								
One day temporary	26	14	8	8	8	22	37	39
Travel	0	0	3	0	0	0	0	116
Red Tag	97	40	17	38	69	181	269	95
Telephonic	0	0	0	0	0	0	0	8
Supervisor's Post-Contacts	425	173	199	144	382	334	440	260
Other Patrol Activities (computed by hours):								<u>300 & 700</u>
File Check	189	223.5	239	459	395	300	300	2,368
Building Check	375	123.25	320.8	1161	395	300	300	868

Arrest Report

<u>Violation</u>	<u>Number of Violations</u>	<u>Cont. Cases from June</u>	<u>Cases Cleared</u>	<u>Cont. & Pending</u>	<u>Fined</u>	<u>Dismissed</u>
Illegal Parking	17	4	7	14	6	1
Illegal Passing	4	2	4	2	4	0
Negligent Driving	1	0	1	0	1	0
No Driver's License	2	0	2	0	2	0
Speeding	5	0	5	0	5	0
	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
TOTAL	29	6	19	16	18	1
Citation Tickets issued:	28					
Verbal Warnings:	0					
Warning Tickets issued:	20					

Patrol Training Activities

440 Patrolmen attended Round Table meetings, safety and security meetings, during the month. Since there are only 391 patrolmen on the roll, some of the men attended more than one session.

194 Patrolmen attended Firearms Training during the same period

Security and Patrol - General

The intensified traffic enforcement program, which was started during June, was continued during July, and during the month 260 audits were made at railroad crossings requiring 143 manhours.

Since the second cycle concerning the audit and inspection of custodians of classified material was started September 1, 1955, our Security Audit and Investigation Unit has completed 1,203 audits.

Security Administration

Daily Badge Log Entries	2,773
"Q" Clearances	132
"L" Clearances	7
Formal "P" clearances issued	37
"P" Approval Clearances issued	22
Category access granted	44
Category access withdrawn	37
Category access revised	28
Number of photos for "A" badges	63
Number of photos for "B" badges	235
Number of persons rephotographed	37 (GE personnel)
Number of photo identification passes laminated and issued:	360
Total "A" badges assembled and distributed to the areas:	621
Total "A" badges received from the areas:	269
Total "A" badges received from the areas for repair:	15

Top Secret Clearances

Clearances cancelled:	22
Clearances requested:	28
Clearances granted:	23

HANFORD ATOMIC PRODUCTS OPERATION
General Electric Company
Richland, Washington

REPORT OF VISITORS FOR PERIOD ENDING JULY 31, 1956

<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>

EMPLOYEE AND PUBLIC RELATIONS DEPARTMENT

I. Visits to other Installations

R. E. Goffman
to: Knolls Atomic Power Lab.
Schenectady, New York

Interview for transfer. D. H. Ahman

7-25-56 7-26-56 X

W. D. Norwood, M. D.
to: Knolls Atomic Power Lab. and control of hazard-
Schenectady, New York ous conditions

Discuss medical hazards L. VanNostrand
W. F. McDonald

7-12-56 7-12-56 X

GP-17

ENGINEERING DEPARTMENT - ADMINISTRATION

A. B. Greninger
to: U. S. Atomic Energy Comm. on Hanford program
Washington, D. C.

Attend AEC meeting

K. E. Fields

7-20-56 7-20-56 X

ENGINEERING DEPARTMENT - DESIGN SECTION

I. Visits to other Installations

W. D. Bainard
to: Knolls Atomic Power Lab.
Schenectady, New York

Design data on use of hydroclones in water
treatment systems on
high temperature recirculation

A. Diffenbaugh

7-17-56 7-18-56 X

W. D. Bainard
to: Oak Ridge National Lab.
Oak Ridge, Tennessee

Design data on use of hydroclones in water
treatment systems on
high temperature recirculation

D.E. Ferguson
G. H. Cartledge

7-18-56 7-20-56 X

DECLASSIFIED

Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data	
					Class.	Unclass. Areas
R. H. Beaton to: Argonne National Lab. Lemont, Illinois	Conference on reactor design programs	S. Lawroski	7-24-56	7-25-56	X	
J. C. Whipple to: E. I. du Pont de Nemours Savannah River Plant Augusta, Georgia	Discuss reactor coolant purification and de-contamination problems	A. A. Johnson	7-26-56	7-27-56	X	
ENGINEERING DEPARTMENT - PILE AND SEPARATIONS TECHNOLOGY SECTIONS						
I. Visitors to this Works						
W. M. Cashin Knolls Atomic Power Lab. Schenectady, New York	Discuss X-ray diffraction on U-Zr alloys	J. J. Cadwell S. H. Bush	7-12-56	7-12-56	X	300 XXX
R. C. Dalzell U. S. Atomic Energy Comm. Washington, D. C.	Discuss fuel processing	M. T. Walling E. F. Volland R. L. Moore	7-18-56	7-18-56	X	300 XXX
M. E. Harris Radiation Laboratory University of California Livermore, California	Discuss fiscal year 1957 efforts for Whitney Project	J. J. Cadwell O. J. Wick	7-25-56	7-26-56	X	200-W 231, 234, 235 300 XXX
P. W. Howe Glenn L. Martin Company Schenectady, New York	Discuss fission product recovery	A. M. Platt	7-12-56	7-12-56	X	100-X XXX 300 XXX
R. L. Johnson Bureau of Mines Albany, Oregon	Inspect zirconium scrap pile and recommendations for its disposal	F. W. Woodfield	7-18-56	7-19-56	X	300 303 700
P. L. Kane Radiation Laboratory University of California Livermore, California	Discuss administrative matters for fiscal year 1957 efforts for Whitney Project	J. J. Cadwell O. J. Wick	7-25-56	7-27-56	X	200-W 231, 234, 235 300 XXX 700

DECLASSIFIED

Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data	
					Class.	Unclass.
T. R. Nveille, Jr. Knolls Atomic Power Lab. Schenectady, New York	Liaison work on KAPL- 120 loop program	J. A. Berberet	2-8-56	1-1-57	X	109-D XXX 100-H 105 100-K 105-KE, 105-KV 300 303
W. J. Ramsey Radiation Laboratory University of California	Discuss fiscal year 1957 efforts for Whitney Project	J. J. Cadwell O. J. Wick	7-25-56	7-26-56	X	200-W 231, 234, 235 300 XXX
E. W. Rebol Aircraft Nuclear Propulsion Division Lockland, Ohio	Discuss pending HAPD services for GE/ANPD fuel program	V. R. Cooper E. W. Christopherson	7-30-56	7-31-56	X	300 XXX
D. W. Richardson Bureau of Mines Albany, Oregon	Inspect zirconium scrap pile and recommendations for its disposal	F. W. Woodfield	7-18-56	7-19-56	X	300 303 700
D. T. Scalise Radiation Laboratory University of California Livermore, California	Arrange for return of UCRL equipment	O. J. Wick	7-12-56	7-12-56	X	200-W 231, 234, 235
H. C. Schweinler Oak Ridge National Lab. Oak Ridge, Tennessee	Consult on solids state problems on radiation damage	J. L. Carter, Jr.	7-17-56	7-18-56	X	100-D XXX 100-K 105-KE 300 303
V. R. Thayer E. I. du Pont de Nemours & Co. Wilmington, Delaware	Solvent extraction processes and equip- ment	R. G. Geier R. E. Smith	7-11-56	7-11-56	X	300 XXX
II. Visits to other Installations						
W. K. Alexander to: Phillips Petroleum Co. Idaho Falls, Idaho	Attend AEC sponsored ETR experiments review meeting	R. J. Nertney	7-16-56	7-21-56	X	
J. A. Ayres to: E. I. du Pont de Nemours Savannah River Plant Augusta, Georgia	Attend fuel element technology discussion	T. C. Evans H. A. Hardt R. D. McCroskey	7-9-56	7-13-56	X	

DECLASSIFIED

Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data	
					Class.	Unclass. Areas
J. A. Ayers to: Knolls Atomic Power Lab. Schenectady, New York	Confer on corrosion problems	D. H. Ahmann	7-11-56	7-13-56		X
J. A. Ayers to: Knolls Atomic Power Lab. Schenectady, New York	Attend conference on corrosion problems	E. L. Brady	7-23-56	7-25-56		X
L. L. Burger to: Oak Ridge National Lab. Oak Ridge, Tennessee	Discussion of chemistry W. H. Baldwin and separations processes		7-16-56	7-20-56		X
S. H. Bush to: Phillips Petroleum Co. Material Test Reactor Idaho Falls, Idaho	Observe GEH-4 experiments and attend ETR Experiments Review Meeting	D. R. Alvord	7-17-56	7-20-56		X
S. H. Bush to: U. S. Atomic Energy Comm. Idaho Falls, Idaho	Attend ETR Experiments Meeting	- -	7-18-56	7-19-56		X
S. H. Bush to: Knolls Atomic Power Lab. Schenectady, New York	Consult on Hanford Assistance Program	C. A. Bruch	7-24-56	7-27-56		X
S. H. Bush to: Battelle Memorial Inst. Columbus, Ohio	Consultation on Hanford Assistance Program		7-30-56	7-30-56		X
S. H. Bush to: Chicago, Illinois	Attend Radiation Damage Effects Review Meeting	- -	7-31-56	8-1-56		X
S. H. Bush to: Argonne National Lab. Lemont, Illinois	Discuss similar phases of ANL-HAPO Metallurgy Program	F. G. Foote	7-31-56	8-3-56		X
J. J. Cadwell to: Nuclear Metals, Inc. Cambridge, Massachusetts	Discuss fuel element fabrication techniques, equipment, etc.	T. T. Magel	7-30-56	7-31-56		X

DECLASSIFIED

Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data	
					Class.	Unclass
J. J. Cadwell to: Metals and Controls Attleboro, Massachusetts	Discuss fuel element fabrication techniques, equipment, etc.	A. R. Matheson	7-30-56	7-31-56	X	
W. R. DeHollander to: U. S. Atomic Energy Comm. hazards Washington, D. C.	Discuss zirconium	D. F. Hayes	7-17-56	7-19-56	X	
G. T. Geering to: Phillips Petroleum Co. Material Test Reactor Idaho Falls, Idaho	Install and observe experiment on GEH-4	D. R. Alvord	7-5-56	7-9-56	X	
W. T. Kattner to: E. I. du Pont de Nemours Savannah River Plant Augusta, Georgia	Attend fuel element technology discussion	T. C. Evans H. A. Hardt R. D. McCroskey	7-9-56	7-13-56	X	
D. C. Kaulitz to: Nuclear Metals, Inc. Cambridge, Massachusetts	Discuss fuel element fabrication techniques,	T. T. Magel	7-30-56	7-31-56	X	
D. C. Kaulitz to: Metals and Controls Attleboro, Massachusetts	Discuss fuel element fabrication techniques, equipment, etc	A. R. Matheson	7-30-56	7-31-56	X	
L. W. Lang to: U. S. Atomic Energy Comm. Washington, D. C.	Discuss economic and technical aspects of special reactor loadings	W. Devine	7-11-56	7-13-56	X	
L. W. Lang to: E. I. du Pont de Nemours Savannah River Plant Augusta, Georgia	Discuss economic and technical aspects of special reactor loadings	W. P. Bebbington C. C. Harris	7-13-56	7-14-56	X	
B. R. Leonard, Jr. to: Zeeman Laboratorium Amsterdam, Holland	Attend international conference on nuclear reactions	- -	7-1-56	7-7-56	X	

DECLASSIFIED

Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data	
					Class.	Unclass. Areas
B. R. Leonard, Jr. to: Atomic Energy Research Establishment Harwell, England	Attend Tripartite conference on neutron cross sections of fissionable materials	- -	7-9-56	7-13-56	X	
B. R. Leonard, Jr. to: Centre De'Etudes Nucleaires de Saclay Paris, France	Discuss slow neutron cross sections and experi- mental techniques	H. H. Landon	7-24-56	7-25-56	X	
M. Lewis to: Phillips Petroleum Co. Material Test Reactor Idaho Falls, Idaho	Observations of GEH-9 experiment	W. B. Lewis	7-16-56	7-20-56	X	
M. Lewis to: Chicago, Illinois	Attend and present paper I. F. Zartman at AEC Radiation Effects Review		7-31-56	8-2-56	X	
J. E. Minor to: Phillips Petroleum Co. Material Test Reactor Idaho Falls, Idaho	Observe GEH-4 experi- ments and attend ETR Experiments Review Meeting	D. R. Alvord	7-17-56	7-20-56	X	
J. E. Minor to: U. S. Atomic Energy Comm. Idaho Falls, Idaho	Attend ETR Experiments Meeting	- -	7-18-56	7-19-56	X	
J. E. Minor to: Knolls Atomic Power Lab. Schenectady, New York	Consult on fuel element C. A. Bruch development program		7-23-56	7-26-56	X	
R. Neidner to: Phillips Petroleum Co. Material Test Reactor Idaho Falls, Idaho	Observe GEH-4 experi- ment on testing program	D. R. Alvord	7-16-56	7-31-56	X	
P. H. Reinker to: Knolls Atomic Power Lab. Schenectady, New York	Discuss assistance to Hanford	T. Snyder	7-5-56	7-6-56	X	

DECLASSIFIED

Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data	
					Class.	Unclass. Areas
E. E. Voiland to: Ionics, Incorporated Cambridge, Massachusetts	Discuss ion exchange technology on uranium processing	J. A. Marinsky	7-6-56	7-6-56	X	
W. P. Wallace to: Nuclear Metals, Inc. Cambridge, Massachusetts	Discuss fuel element fabrication techniques, equipment, etc.	T. T. Magel	7-30-56	7-31-56	X	
W. P. Wallace to: Metals and Controls Attleboro, Massachusetts	Discuss fuel element fabrication techniques, equipment, etc.	A. R. Matheson	7-30-56	7-31-56	X	
E. A. Weakley to: E. I. du Pont de Nemours Savannah River Plant Augusta, Georgia	Attend fuel element technology discussion	T. C. Evans H. A. Hardt R. D. McCroskey	7-9-56	7-13-56	X	
H. F. Zuhre to: U. S. Atomic Energy Comm. Washington, D. O.	Discuss economic and technical aspects of special reactor loadings	W. Devine	7-11-56	7-13-56	X	
H. F. Zuhre to: E. I. du Pont de Nemours Savannah River Plant Augusta, Georgia	Discuss economic and technical aspects of special reactor loadings	W. P. Bebbington C. C. Harris	7-13-56	7-14-56	X	
R. Thayer to: I. du Pont de Nemours & Co. Wilmington, Delaware	Discuss technical problems in the separa- tion purification and metal reduction processes	C. A. Priode	7-11-56	7-13-56	X	100-X 105-KE, 105-KW 200-E 202-A, 201-C 200-W Redox, 221-U, 234, 235 300 XXX; 700
Visits to other Installations						

MANUFACTURING DEPARTMENT

Visitors to this Work

DECLASSIFIED

Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data	
					Class.	Unclass.
G. E. Backman to: Naval Radiological Defense Laboratory San Francisco, California	Participate in "Operation Redwing"	G. L. Baletti J. E. Law	3-12-56	8-1-56		X
G. D. Brown to: Naval Radiological Defense Laboratory San Francisco, California	Participate in "Operation Redwing"	G. L. Baletti J. E. Law	5-21-56	8-30-56		X
L. A. Carter to: Naval Radiological Defense Laboratory San Francisco, California	Participate in "Operation Redwing"	G. L. Baletti J. E. Law	5-21-56	8-31-56		X
W. K. MacCreedy to: General Electric Co. Schenectady, New York	Discuss organization and salary administration problems	N. Firestone F. T. Lewis W. W. Beardslee	7-11-56	7-12-56		X
W. K. MacCreedy to: U. S. Atomic Energy Comm. Washington, D. C.	Discuss special production planning	E. J. Bloch	7-13-56	7-13-56		X
R. E. Olson to: U. S. Atomic Energy Comm. Fernald, Ohio	Discuss uranium quality control	W. Warner	7-2-56	7-3-56		X
R. E. Olson to: National Lead Company Fernald, Ohio	Discuss uranium quality control	J. C. Mead	7-2-56	7-3-56		X
R. E. Olson to: Mallinckrodt Chem. Wks. St. Louis, Missouri	Discuss uranium quality control	J. U. Shepardson	7-5-56	7-6-56		X

RADIOLOGICAL SCIENCES DEPARTMENT

I. Visitors to this Works

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Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data	
					Class.	Unclass. Areas
R. L. Dobson Radiation Laboratory University of California Berkeley, California	Discuss problems of medical services and current investigations and present a seminar	W. D. Norwood L. K. Bustad	7-10-56	7-13-56	X	100-F XXX 200-E XXX 200-W XXX 300 XXX
J. Z. Holland Reactor Safeguard Committee U. S. Atomic Energy Commission Washington, D. C.	Discuss meteorological problems	G. R. Hilst	7-10-56	7-10-56		X 200-W 622 Bldg.
A. Rothstein University of Rochester Rochester, New York	Discuss radioactive inhalation problems and present a seminar	H. A. Kornberg	7-24-56	7-26-56	X	100-F XXX 200-E 202-A 200-W Redox, 221-U 300 XXX
J. N. Stannard University of Rochester Rochester, New York	Discuss radioactive inhalation problems and present a seminar	H. A. Kornberg	7-24-56	7-26-56	X	100-F XXX 200-E 202-A 200-W Redox, 221-U 300 XXX
II. Visits to other Installations						
C. K. Irwin to: U. S. Naval Radiological Defense Laboratory San Francisco, California	Participate in "Opera- tion Redwing"	G. L. Baletti J. E. Law	5-21-56	8-31-56	X X	

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DECLASSIFIEDRADIOLOGICAL SCIENCES DEPARTMENTJULY, 1956SUMMARY

There were eighteen informal, seven Class I, and three Class II radiation incidents. Two of the Class II incidents involved localized exposure of the hand, probably in the range of 5-10 rads. The third case had minor significance.

Three cases of plutonium deposition arising from a single incident of the previous month were carefully followed; one is expected to show a deposition of perhaps 5 to 10 times the permissible limit.

The old case of plutonium deposition referred to last month changed prognosis by the localization and effective removal of plutonium still residing at the site of a puncture wound.

Release of I^{131} was well controlled.

The content of Co^{60} in TBP scavenged wastes continued to be troublesome; temporary relief from using up storage capacity was in sight for mid-August.

There is a modification of the confidence with which the origin of P^{32} in reactor effluent was assigned to activation of sulfate.

Gross performance against 1956 budget is reported.

Success was achieved in measuring the vertical concentration gradient in stack gas plumes. This will accelerate the solution of effluent dispersal problems.

RADIOLOGICAL SCIENCES DEPARTMENT

JULY, 1956

The month-end force of 436 included 36 supervisors, 103 engineers and scientists, 26 clerical, and 271 other personnel.

Number of Employees on Payroll

Beginning of Month	424
End of Month	436
Net Increase	12

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 28 radiation incidents including 7 Class I and 3 Class II incidents. Two of the latter related to localized hand exposures in the probable range of 5-10 rads. The third was essentially an administrative technicality, with a total dose of 355 mr in seven consecutive days.

Three cases of plutonium deposition arising from last month's Redox incident were carefully followed. One of these will probably show a deposit in the range of 5 to 10 times the permissible limit.

The case described last month as being indeterminate between 50% and 130% of the permissible limit has now been partially resolved. New techniques successfully located a considerable deposit at the original site of a puncture wound that occurred in 1952; it was removed surgically. The outlook now is that the body deposit will be about 50% of the limit.

At midyear, exposure to external radiation was in reasonable balance with no employee showing a total dose (gamma radiation) in excess of 2 r; this compares with 4 such entries in the same period of 1955. The number above 1 r increased from 113 to 266. The annual working limit this year is 3 r, with some consideration of having 2 r next year. Thus the second half of 1956 offers a good test of whether the new limit will be achievable in 1957; obviously, if no individual receives more than 1 r in the second half of 1956, none will exceed 3 r for the current year.

The average weekly emission of I^{131} was held to about 2 curies. Thyroid activity of rodents in the reservation was high as a result of the previous month's emissions. This was augmented, too, by depositions of atomic bomb fallout containing the shorter-lived radioiodine isotopes.

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Radiological Sciences Department

An improved water sampling system was installed at the Pasco Water Plant inlet. This will better discharge our public responsibility to know the radioactive contamination at this location.

The recent Redox incident led to a recommendation that alarm-type monitors for plutonium in air be installed. Previously this has received some passive resistance because it is not possible with present technology to get down to the permanent MPL. A unit has now been prepared that alarms in the range of 10 to 100 times the MPL. This would have alleviated the subject incident. However, steps will have to be taken to prevent complacency when the alarm is not ringing, since this is not an assurance of permanently tolerable conditions.

Last month we reported that the P^{32} content of reactor effluent was principally due to activation of sulfur in sodium sulfate in the water. A closer look at this problem suggests now that the conclusion is only indirectly correct. It seems more likely that the P^{32} arises from trace chemical impurities of phosphorus in the supposedly chemically pure sodium sulfate used. An impurity of a few parts per billion would have the observed effect. This is outside the range of conventional analysis, and ordinary activation analysis, of course, begs the question. Technically feasible may be activation analysis with different groups of monoenergetic neutrons. Whether the significance of the results justifies this complex study is now being studied.

The vertical distribution of radioactivity in a plume of contaminated air from a stack needs to be known for the firming up of parameters in the equations describing dissemination of such plumes. The use of tethered blimps offers an obvious approach, which has heretofore been unsatisfactory because of problems in precise positioning of the test apparatus. This difficulty has been solved, and the meteorological program should now show real progress in this field.

The need to retain TBP scavenged wastes because of Co^{60} content continued. Relief from this tank space consuming problem will be achieved in mid-August when suitable open trenches are available. These will operate on the specific retention principle so that the material is sponged up in the ground rather than going through to ground water.

Further work was done in Biology to measure the augmented uptake of radioisotopes in young animals. Eventually this experience has to be related quantitatively to what may happen with children drinking radioactively contaminated water. Currently, the Laboratory is far from achieving this objective.

The planning of experiments on the toxicity of radioactive particles in the lung advanced on schedule.

At the end of the fiscal year, expenditures on research and development were about 1% below budget. In protection of plant and personnel, there was an overrun of about 2%; this was largely due to imbalance caused by the strike among construction workers.

Radiological Sciences Department

The NAS report on biological effects naturally stimulated the organization to take a new look at our reporting practices with respect to various degrees of radiation exposure. The basic HAPD policy is a simple one—namely to practice full and forthright communication on all exposure matters affecting an employee's welfare. The realization of this policy is a mixture of directive policy and lore that has developed over a 12 year period. This lore has been highly effective, and as shown by attitude surveys, has gained the confidence of the majority of employees.

Recent experience, for example with plutonium cases, led to some favoring of more definitive policy. The AEC is now inquiring into such practices on a national scale. Before local changes are made, it will be helpful to wait until we have access to this wider body of opinion.

In 1948, this organization published in the open literature some calculations of the possible shortening of life span by radiation in Hanford practice. Quite recently there has been a revision of data in this field that would lead to higher values for shortening. The new data are controversial, but they have the benefit of an additional 8 years of study. The results are important, and will be followed closely. Some of the results were factored into the new I.C.R.P. life time limit (actually to age 60) of 200 r. Present formal practice would permit over 800 r in the same time. Hanford practice would set a limit of 120 r, and for other reasons we are considering a reduction to about 80 r. The average lifetime exposure of Hanford personnel is about 8 r. It will be observed that the conservative policy that General Electric has always advocated is being more nearly approached, as time goes by, by organizations that were once dubious of, or even actively scornful of, local practices.

Director,
RADIOLOGICAL SCIENCES DEPARTMENT

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Radiological Sciences Department

APPENDIX1. Condensed Exposure Records

Type	Number of Readings	Potential High Results	Confirmed High Results
Pocket chambers - gamma	299,398	42	1
Pocket chambers - slow neutron	2,236	0	0
Film Badges - beta-gamma	59,904	7	1
Neutron film	745	2	0
Pu bioassay	940	37	0
F. P. bioassay	1,141	2	0
U bioassay	326	11	0
Alpha hand counts	61,590	0	0
Beta hand counts	56,413	0	0
Thyroid counts	0	0	0

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Radiological Sciences Department2. Regional Monitoring Records

Sample Type and Location	Activity Type	Average Activity Density $\mu\text{c/ml}$	Trend* Factor
<u>Drinking Water and Related Materials</u>			
Benton City Water Company Well	alpha	1.2×10^{-8}	--
Richland, N. Richland, Benton City Wells	alpha	$(<0.5 \text{ to } 1.2) \times 10^{-8}$	--
100 Areas	beta	$(0.09 \text{ to } 1.5) \times 10^{-6}$	--
200 Areas	beta	$(1.5 \text{ to } 2.1) \times 10^{-7}$	+2
Pasco, Kennewick, McNary Dam	beta	$(<0.5 \text{ to } 7.6) \times 10^{-7}$	--
Backwash Solids - Pasco Filter Plant	beta	7.1×10^{-3}	--
Backwash Liquids - Pasco Filter Plant	beta	8.7×10^{-7}	--
Anthracite, Sand Filter - Pasco Filter Plant	beta	4.6×10^{-5}	--
<u>Other Waters and Related Materials</u>			
300 Area Wells 1 and 3	alpha	$(0.09 \text{ to } 2.5) \times 10^{-7}$	+2
300 Area Well 4	alpha	1.8×10^{-7}	--
Well 4 measured as Uranium U	U	1.5×10^{-7}	--
107 and 108 Wells	beta	$(<0.0005 \text{ to } 6.3) \times 10^{-4}$	+2
200 East Wells	beta	$0.7 \times 10^{-8} \text{ to } 4.7 \times 10^{-1}$	--
200 West Wells	beta	$3.0 \times 10^{-8} \text{ to } 1.9 \times 10^{-2}$	--
Wells Near 200 Areas	beta	$(<0.5 \text{ to } 1.6) \times 10^{-7}$	--
Outlying Wells	beta	$(<0.5 \text{ to } 1.2) \times 10^{-7}$	--
Columbia River - Hanford Ferry	beta	6.3×10^{-6}	--
Columbia River - Below Reactors	beta	6.0×10^{-6}	-2
Columbia River - Paterson to McNary	beta	2.1×10^{-7}	--
Columbia River - Shore Mud	beta	$(1.1 \text{ to } 5.4) \times 10^{-5} \mu\text{c/gm}$	--
Raw Water - Operating Areas	beta	$(<0.05 \text{ to } 3.7) \times 10^{-6}$	--
Reactor Effluent Retention Basins to River	beta	$6,000 \text{ to } 29,000 \mu\text{c/sec/reactor}$	--
Reactor Effluent Retention Basins to River	alpha	$(1.8 \text{ to } 7.1) \times 10^{-3}$	--
I-131 in Farm Wastes to River	I-131	$<0.04 \mu\text{c/sec/reactor}$	--
I-131 in Columbia River - Hanford	I-131	$<5 \times 10^{-9}$	--
300 Area Pond Inlet	alpha	$11.1 \mu\text{c/day}$	--
		1.9×10^{-7}	--
		1.4×10^{-8}	--
		2.3×10^{-6}	--

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Radiological Sciences Department

Sample Type and Location	Activity Type	Average Activity Density μc/ml	Trend* Factor
<u>Atmospheric Pollution</u>			
Gross Alpha Emitters	alpha	$(<0.4 \text{ to } 0.8) \times 10^{-14}$	-4
Gross Dose Rate - Separations Areas	beta - gamma	1.2 to 7.1 mrad/day	--
Gross Dose Rate - Residential Areas	beta - gamma	1.8 to 9.4 mrad/day	--
Active Particles - Separations Areas	beta	$(2.1 \text{ to } 7.0) \times 10^{-13}$	--
I-131 Separations Areas	I-131	$(0.1 \text{ to } 1.9) \times 10^{-12}$	--
I-131 Separations Stacks	I-131	0.3 curie/day	-9
Ruthenium - Separations Stacks	Ru ¹⁰³⁻¹⁰⁶	<0.01 curie/day	--
Active Particles - Wash., Idaho, Ore., Mont.	--	0.04 to 0.21 ptle/m ³	+4
Active Particles - Project	--	0.02 to 0.11 ptle/m ³	--
<u>Vegetation</u>			
Environs of Separations Areas	Iodine	$(0.3 \text{ to } 7.3) \times 10^{-5} \mu\text{c/gm}$	+5
Residential Areas	Iodine	$(<0.03 \text{ to } 5.7) \times 10^{-5} \mu\text{c/gm}$	+5
Eastern Washington and Oregon	Iodine	$(<0.03 \text{ to } 1.5) \times 10^{-4} \mu\text{c/gm}$	+4
Non-Volatile Beta Emitters Wash. and Ore.	beta	$(<0.1 \text{ to } 9.3) \times 10^{-4} \mu\text{c/gm}$	+3
Alpha Emitters - Separations Areas	alpha	$(<0.5 \text{ to } 0.9) \times 10^{-7} \mu\text{c/gm}$	-3

* The trend factor shows the n-fold increase (+) or decrease (-) from last month, where values of n less than 2 will not be noted.

FINANCIAL DEPARTMENT MONTHLY REPORT

July, 1956

Modification No. 4 to Appendix B to the Prime Contract was executed in July by the Atomic Energy Commission. This provides for an increase in the per diem schedule and certain other travel and living allowances for off-site inspection and expediting personnel. Modification No. 5, which eliminates certain details of the Salary Plan from Appendix B and makes some revisions with respect to travel provisions for interviews for certain prospective employees and travel and moving expenses for new employees, was submitted to the AEC. Modification No. 3, which includes the G.E. Emergency Aid Plan and a minor change in the wording of provisions for moving expense, is still pending with the Commission.

AEC-GE agreements necessary because of prime contract provisions were signed with respect to: (1) work or services to be performed by HAPO which is related to other programs of the Commission or of other Government agencies in accordance with Article II, paragraph 8(d) (often referred to as "related services" under the Basic Contract); (2) the system of product inspection to be maintained (Article VI, Section 5); and (3) the research and development program for the fiscal year 1957 (Article VI, Section 7).

Department budgets for the first two months of fiscal year 1957 for travel and living expense variation and conference expense (both chargeable to the fee under Contract W-31-109-Eng-52) and for attendance at meetings of professional and trade societies, in connection with which, by the terms of Appendix B to the Contract, certain controls are required, were established early in July. Similar budget figures for the entire fiscal year 1957 for the new organization were also determined in July and discussed with the study managers.

The net result of year-end adjustments and clearances of over- and under-liquidations of charges was a credit of \$461,300 to production costs. Principal items comprising this credit were a refund of \$572,000 from the Metropolitan Life Insurance Company which brought about an over-accrual in Continuity of Service Expense Accrued of \$552,950, and cost over-liquidations of \$137,520 (net), offset by the establishment of increased inventory reserves of \$229,170 (net).

Comparisons of actual results for FY 1956 with the Annual Goal were prepared and submitted to Management by the Manufacturing Cost Unit. In some cases comparisons were issued to unit supervision to point out major causes of overruns and to bring to supervisors' attention the areas where cost control is most needed.

The average daily census at Kadlec Hospital was 50.2, compared to a budgeted average of 48.0. In July of last year the actual average was 47.1. During the first week in August the census had increased to an average of 53.0. It therefore appears that the hospital will experience no financial difficulty during the short time it remains under General Electric jurisdiction.

Essential Material prices were established for the first quarter of FY 1957. The price of pit coal increased from \$7.64/ton to \$7.93 to reflect current market prices. Changes were also made in ANN and Nitric Acid prices to reflect a higher market price. ANN went from \$3.20/Cwt. to \$3.75 and Nitric Acid went from \$2.78 to \$3.10/Cwt. A substantial increase was made in fuel oil price when it became necessary for Purchasing to buy f.o.b., Salt Lake City rather than f.o.b., Seattle. Oil from Salt Lake City will cost \$12.83 compared with Seattle price of \$6.46/hundred gallons. In the event Purchasing is able to obtain delivery from a closer source, a reduction will be made to reflect lower freight rates.

The "Annual AEC Motor Vehicle Reports" schedules 82, 82-A, 82-B, the inventory of special purpose and contaminated vehicles, and accident damage detail was prepared and forwarded to the local AEC office on schedule.

Operating procedures were formulated by personnel of the Engineering Cost Unit with respect to accountability and control of certain functions being assumed by the J. A. Jones Company on August 13. These procedures, covering the items enumerated below, will be forwarded to the Commission for transmittal to its contractor:

- Project Materials Warehousing
- Construction Stores (includes stainless steel)
- Small Tools, Protective Clothing and Fixtures
- Shop Equipment
- Major Equipment
- Cost Transfers and Reports

The report on physical inventory of construction and operations excess materials and equipment disclosed a net overage of \$1,021. A review indicated that this overage consisted principally of segments of lots sold at public sale which were unclaimed by the buyers. Total value of materials and equipment inventoried was \$890,346.

The report on physical inventory of special materials (excluding graphite) disclosed a net shortage of \$309. This variance, representing 0.08% of total book value, consisted of platinum lost in process and not currently reported. Approximately 99.5% of the materials were either actually weighed or physically observed. Total value of materials inventoried was \$365,462.

Property listings showing facility assignments that will be effective after reorganization were forwarded to the six new department and operation managers by the Property Accounting Section. The cost of these facilities will be segregated and available by department and operation about September 1, 1956.

A complete definition of all plant and equipment accounts at HAPO level was completed during July. This program involves the presentation of the purpose of each account and a listing of all units of property to be contained in the account.

A list representing proposed reassignment of primary management responsibility of construction projects under the decentralized organization was submitted by the Property Accounting Section to Department Managers for review and comments. A revised list incorporating recommendations made by the Department Managers will be prepared for final review and issuance by W. E. Johnson.

Thirteen project proposals and informal requests representing an aggregate of \$1,421,050 were reviewed, approved, and processed to the Commission during the month. After receipt and analysis of AEC Directives and Work Authorities, nine project authorizations were issued for a total of \$619,500.

The conversion of a reactor power and exposure studies calculation, being used in a special operations research study, to the IBM 702 was accomplished in July. Data for the period from September, 1955 through April, 1956, was processed to accumulate tube-by-tube exposure figures for all reactors and to report the exposure of discharged tubes. Approximately an hour of machine time was required to process a month's data for all reactors.

The preparation of the monthly payroll on the electronic data processing machine began on a regular basis in July, a trial run having been made in June.

The installation of a 20,000-position magnetic core storage for the IBM 702 machine on July 19 through 22 doubled the electrostatic storage capacity of the 702 equipment. It will increase the speed of certain applications, make others easier to program, and reduce memory failures.

The forecast of SS material requirements for the period from October 1, 1956 through October 30, 1957 for HAP0 are currently being consolidated for presentation of the SS Allotment Forecast Report to the AEC. Due to the exacting AEC requirements, this consolidation constitutes the major activity of the SS Accountability Section.

The annual "Summary of Disbursements" for the fiscal year 1956, compilation of which was completed in July, listed net cash expenditures totaling \$85,920,550, as follows:

Payrolls and payroll deductions disbursed	\$54 813 336
Materials (including orders placed on requirements contracts) and freight	28 658 560
Employee benefits	3 802 203
Taxes and insurance	2 018 465
Subcontracts and agreements	965 159
Advances for travel and living expense	936 039
Miscellaneous	<u>1 077 331</u>
Gross disbursements	92 271 093
Less: Cash receipts	<u>6 350 543</u>
Net disbursements	<u>\$85 920 550</u>

Detailed reports for the Financial Department appear on succeeding pages, as follows:

Summary of Cash Disbursements, Receipts and Advances	I - 5
Auditing Section	I a - 1
Budgets and Measurements Section	
Contract Cost Section	I b - 1 through I b - 4
General Accounting Section	I c - 1 through I c - 7
Personnel Accounting Section	I d - 1 through I d - 3
Procedures and Computing Section	I e - 1 through I e - 9
Property Accounting Section	I f - 1 through I f - 6
SS Accountability Section	I g - 1 through I g - 4
Personnel and Organization Statistics	I h - 1 through I h - 2

SUMMARY OF CASH DISBURSEMENTS,
RECEIPTS AND ADVANCES

A summary of cash disbursements and receipts (excluding advances by the Atomic Energy Commission of \$6,900,000 for July and \$6,450,000 for June) for the months of July, and June, 1956 is shown below:

<u>Disbursements</u>	<u>July</u>	<u>June</u>
Payrolls (net)	\$3 165 589	\$3 790 502
Materials and Freight	1 625 782	1 798 086
Payroll Taxes	1 184 901	759 928
Payments to Subcontractors	369 330	530 850
Group Insurance Premium	232 549	232 412
United States Savings Bonds	149 800	269 124
Travel Advances to Employees	65 442	86 245
Pension Plan--Employees' Portion	44 181	32 354
All Other	223 868	163 229
Total	<u>7 061 442</u>	<u>7 662 730</u>
<u>Receipts</u>		
Rent	110 147	116 396
Electricity	58 345	54 781
Telephone	55 107	53 952
Sales to AEC Cost-type Contractors	52 924	91 471
Hospital	51 932	52 664
Sundry Accounts Receivable	19 139	12 153
Refund of Travel Advances to Employees	12 870	9 144
Bus Fares	8 407	8 388
Refunds from Vendors	3 846	1 463
Refund of Group Insurance Premium--1955	-0-	572 152
Other	19 231	34 023
Total	<u>391 948</u>	<u>1 006 587</u>
Net Disbursements	<u>\$6 669 494</u>	<u>\$6 656 143</u>

Outstanding advances as of July 31, and June 30, 1956 were as follows:

	<u>July</u>	<u>June</u>
Cash in Bank - Contract Accounts	\$2 116 905	\$1 886 399
Cash in Bank - Salary Accounts	20 000	20 000
Total	<u>\$2 136 905</u>	<u>\$1 906 399</u>

AUDITING SECTION

July 1956

Reports were issued for the following audits:

Travel, Living and Entertaining Expense
Stores Activities
Weekly Payroll and Timekeeping

At month-end reports were being prepared for the following audits:

Construction Costs
Suggestion Plan
General Accounts
Excess Sales

The following audits were started during the month:

G. E. Insurance Plan
Industrial Insurance, Medical Aid and Pension Awards

Follow-ups were made to determine the extent of compliance with recommendations in reports of the following audits:

Deposits and Income from Investments
Construction Work in Progress

An auditor attended a meeting in Olympia on July 24, 1956 to consider a proposal submitted by the State Department of Labor and Industries for revising the basis of determining HAPO's portion of the Department's administrative costs.

Three employee information meetings were held during the month.

BUDGETS AND MEASUREMENTS SECTION
AND CONTRACT COST SECTION
MONTHLY REPORT - JULY 1956

General

Major efforts during July were devoted to the year-end closing which was accomplished in an orderly and prompt manner. Close cooperation was experienced with the Finance Division of HOO-AEC and all reports went out on time.

The next greatest efforts were centered around the forthcoming reorganization. All reports were examined to determine usefulness and necessity. Many were discontinued and an additional group was prepared in scroll only to maintain continuity of our records. This action was taken to free employees part time to develop new ledgers and reporting forms and to obtain familiarity with new assignments and organization structures.

Employee and Public Relations Cost Unit

The average daily census at Kadlec Hospital was 50.2 compared to a budgeted average of 48.0. In July of last year the actual average was 47.1. During the past week the census has increased to an average of 53.0. It therefore appears that the hospital will experience no financial difficulty during the short time it remains under General Electric jurisdiction.

It is probable that the planned move of Industrial Medical to the Medical-Dental Building will not take place on August 15 as originally expected. The move is contingent on the cancellation of the leases of two doctors currently occupying a portion of the building. No firm date for the move has been established as this is written.

Community management was advised regarding the funds as budgeted for FY 1957 by General Electric and changes which were made by the AEC in their submission to Washington. It was pointed out that the delay in the disposal program and changes which are contemplated in the maintenance program will have a major effect on the operation of the Community and that these factors will be taken into consideration in the mid-year review when they are better known.

In the Plant Activities Cost Sub-Unit final analysis letters were delivered to section and unit managers on the seventh working day after the final cost entry.

A change in the liquidation procedure for Rotational Trainees should liquidate total cost of the unit with minor variances treated as over or under absorbed cost. In the past the over or under liquidation has been allocated to General and Administrative Expense. This change was accomplished by raising the overhead percentage from 25 to 40%. This was called to the attention of the other accountants several months ago.

Costs incurred by the 700 Area Landlord have been reviewed and an estimate of FY 1957 costs made. It is felt that an over-liquidation of costs would occur if the same rental rate were used; therefore, the rate for the category of "Other Space" was reduced from \$.20 to \$.15 per square foot.

Manufacturing Cost Unit

As a result of overcommitting the equipment budget at Hanford for fiscal year 1956, it was necessary to eliminate all work orders on which work had not been started as

Manufacturing Cost Unit (Continued)

of June 30 from the commitment figures. This resulted in approximately \$26,000 reduction of commitments. Another \$10,000 reduction was made in the commitment figures as a result of overestimates on work orders which were active as of June 30, but closed during the first two weeks in July.

Essential Material prices were established for the first quarter of FY 1957. The price on pit coal increased from \$7.64/ton to \$7.93 to reflect current market prices. Changes were also made in ANN and Nitric Acid Prices to reflect a higher market price. ANN went from \$3.20/CWT. to \$3.75 and Nitric went from \$2.78 to \$3.10/CWT. A substantial increase was made in fuel oil price when it became necessary for Purchasing to buy F.O.B., Salt Lake City rather than F.O.B., Seattle. Oil from Salt Lake City will cost \$12.83 compared with Seattle price of \$6.46/hundred gallons. In the event Purchasing is able to obtain delivery from a closer source, a reduction will be made to reflect lower freight rates.

The "Annual AEC Motor Vehicle Reports" schedules 82, 82-A, 82-B, the inventory of special purpose and contaminated vehicles, and accident damage detail was prepared and forwarded to the local AEC office on schedule.

Examination was made of the proposed G.S.A. reporting requirements for Fiscal Year 1957. Items included in this revision are more clearly defined and should produce uniformity throughout all government agencies. The detailing of overhead costs and the inclusion of depreciation will involve some additional work. However, with advance notice, changes can be effected with a minimum of additional clerical effort.

"Quarterly Savings and Improvement" reports for the quarter ended June 30, 1956, were prepared and submitted for each of the three operating Sections.

Comparisons of actual results for FY 1956 with the Annual Goal were prepared and submitted to Management. In some cases comparisons were issued to unit supervision to point out major causes of overruns and to bring to supervisions's attention the areas where cost control is most needed.

Assistance was given to the Inventory Accounting Unit in taking the annual Special Material Inventory and the Essential Material Inventory.

As part of the Metal Preparations Sections's manpower development program, two exempt engineers and one rotational trainee were routed through the Financial Representatives office to receive training in the use and application of accounting procedure and practices.

The Reactor Section's cost meeting for July included in addition to a discussion of June costs, the following subject: (1) Philosophies and problems connected with new reactor design, and (2) Cost of Protective Clothing use in radiation zone work - laundry and clothing replacement.

In cooperation with the Education and Training Unit the regularly scheduled cost control program was presented by Separations Section Financial Representative at W-10 on July 16.

To assist the customer and servicing units in determining the status of work order costs, a copy of the customer and/or service billing reports have been obtained for distribution. This report shows the maintenance costs by customer and total charges to the work order or expense code, the amount of labor, IME, and material

Manufacturing Cost Unit (Continued)

charges. It is felt that the report will assist both the customer and servicing units in maintaining a more positive control over maintenance and maintenance expenditures.

All Property Custodians in the Separations Section were contacted during the month and urged to complete their outstanding Capital Addition and Retirement Closing Report forms, and forward them to Manufacturing Cost, as early as possible.

Engineering Cost Unit

Operating procedures were formulated by personnel of the Project Cost group with respect to accountability and control of certain functions being assumed by the J. A. Jones Company on August 13. These procedures, covering the items enumerated below, will be forwarded to the Commission for transmittal to its contractor:

Project Materials Warehousing
Construction Stores (includes stainless steel)
Small Tools, Protective Clothing and Fixtures
Shop Equipment
Major Equipment
Cost Transfers and Reports

An examination of the purchasing procedures of the J. A. Jones Construction Company was completed and suggestions were offered to clarify the areas where approval of the General Electric Company would be required.

With concurrence of the Atomic Energy Commission, the salaries plus 20% for continuity of service and other expenses of Minor Construction personnel, who will be displaced by the transfer of the aforementioned functions to the collateral contractor, are being charged to Reserve for Close-Out Expense. This will continue while the new employees are being trained and until the displaced personnel have been reassigned. Charges to the reserve for the month amounted to \$4,428, and it is estimated charges for August will total \$12,960.

As a result of the shortage of qualified welders in the area, the J. A. Jones Construction Company negotiated a contract with the Bay Company to perform welding services on Project CG-558. Amounts paid on this contract will be transferred to General Electric Company for inclusion in project cost. It has been indicated that J. A. Jones Construction Company may enter into another contract in order to accomplish the piping work on Project CG-598.

Unofficial information in connection with Washington review of our FY 1958 Plant Acquisition and Construction Budget indicates a \$11,100,000 reduction at this time. Comparison of the total dollars approved by the various reviewing agencies at this time are as follows:

<u>GE Submission</u>	<u>HOO-AEC Submission</u>	<u>Proposed Submittal By Division of Production</u>
\$50,616,000	\$47,705,000	\$36,605,000

Engineering Cost Unit (Continued)

The following schedule reflects the revised status of General Electric obligation of funds for Plant Acquisition and Construction Projects at June 30, 1956:

(Dollar Amounts in Thousands)	<u>Special Nuclear Materials Program</u>		<u>Community Program</u>	
	<u>FY 1955 & Prior Years</u>	<u>FY 1956</u>	<u>FY 1955 & Prior Years</u>	<u>FY 1956</u>
Funds Obligated	\$69,000	\$10,043	\$213	\$201
Less:				
Cost at 6/30/56	<u>46,585</u>	<u>2,867</u>	<u>208</u>	<u>107</u>
	<u>\$22,415</u>	<u>\$ 7,176</u>	<u>\$ 5</u>	<u>\$ 94</u>

General and Consolidated Cost Unit

A meeting was held with P. R. McMurray, Manager of Radiological Engineering, to explain our proposal for a monthly accrual charging Equipment Work in Progress and crediting Cost for estimated costs incurred on the effluent monitor. Mr. McMurray has tentatively agreed to the proposal and is to give us his final answer this month. As mentioned in my June Report, the accrual would preclude substantial distortions in monthly operating reports.

During July the charges for Procedures and Computing services were switched from the hourly billing procedure to a standard billing system. All P & C services will be billed at a "contracted" rate in the future.

The reorganization study continued to occupy substantial amounts of the Unit members' time, with work being done on procedures for the preparation of consolidated cost and inventory reports, cost liquidation methods for Hanford Laboratories Operation, and general reorganization activities by the writer.

GENERAL ACCOUNTING SECTION

JULY, 1956

ACCOUNTS PAYABLE UNIT

Vouchers processed during the month numbered 3,403 and amounted to \$3,478,323, which was a considerable reduction in volume as compared to recent months. There also was significant reduction in the activity of the freight account due to the cessation of coal shipments for a two-week period during July; 955 freight bills amounting to \$174,916 were paid during the month as compared to the June volume of 1,321 bills amounting to \$299,679.

The work load of the individual invoice auditors has been reviewed and reassignments have been planned to absorb the vendor accounts of auditors who may be transferred to other components at the time of HAPO reorganization on September 1, 1956.

Active contracts handled by Accounts Payable, excluding requirements orders numbered 50 and contract commitments at month-end amounted to \$449,395. Payments on these contracts during July were \$40,863.

During this period two contracts were dropped from the active status due to financial completion. They are Supply Contract No. SO-8 with the Aluminum Company of America and Special Agreement No. G-26 with the General Telephone Directory Company.

Consultant Agreement No. CA-112 with Dr. P. E. Church for radiological and meteorological services was renewed as Consultant Agreement No. CA-135. Six new contracts were received by Accounts Payable during July as follows:

DDR-8	State College of Washington Design and fabricate a hydraulic model of a water wall	\$12 950
CA-140	Dr. Clinton G. Lyons Radiological services	\$ 590 per month
CA-141	William Shannon & Stanley D. Wilson d/b/a/ Shannon & Wilson Consultation on disposal of radioactive waste	\$ 100 per day
CA-142	Warren J. Kaufman Consultation on disposal of radioactive waste	\$ 80 per day
CA-144	Hugh H. Russel Appraisal of property known as Pennywise Drug Store	\$ 250
MRO-2	The Travelers Indemnity Company Inspection of boilers, pressure vessels, elevators, fabrications and installations	\$ 45 per day

ACCOUNTS PAYABLE UNIT, Continued

Requirements contract orders placed during July numbered 14 in the amount of \$434,631, and commitments at month-end totaled \$869,332. Payments under requirements contract orders were \$327,774.

Following is a resume of Accounts Payable statistics for June and July:

Accounts Payable:

	July	June
Balance beginning of month	\$ 986 307	\$ 572 235
Vouchers entered	3 478 323	3 980 376
Cash receipts	3 846	1 462
Journal Entries (7033-July and 6048-June)	35 337 Dr.	35 337
	4 433 139	4 589 410
Less: Vouchers Paid	3 746 053	3 603 103
Balance at end of month	\$ 687 086	\$ 986 307
Number of vouchers recorded	3 403	4 432
Number of checks issued	2 513	2 664
Number of freight bills paid	955	1 321
Amount of freight bills paid	\$ 174 916	\$ 299 679
Number of purchase orders received	1 952	2 041
Amount of purchase orders received	\$1 485 744	\$1 529 182
Amount of cash discount earned	\$ 4 656	\$ 7 388

ACCOUNTS RECEIVABLE UNIT

The gross accounts receivable balance at July 31, 1956 amounted to \$315,926, an increase of \$23,329 when compared to the balance of \$292,597 at June 30, 1956. The increase results primarily from increases in AEC Cost-Type Contractors' accounts and Sundry accounts amounting to \$24,511 and \$6,364 respectively. These increases were partially offset by a decrease of \$6,276 in Electricity accounts. Explanation of the variance in the above account balances is as follows:

AEC Cost-Type Contractor - Billings to other integrated contractors during July amounted to \$77,434, an increase of approximately \$25,000 over like billings for June. Although cash receipts were normal for the month, the majority of billings were forwarded during the latter part of the month, therefore, not allowing time for payment of current invoices prior to the end of the month.

Sundry - Billings during July amounted to \$25,593, an increase of approximately \$11,000 over billings for June. Cash receipts during July amounted to \$18,566, an increase of approximately \$4,750 over cash receipts for June. Included in the month-end balance was a billing to the Richland Public Schools for nursing services amounting to \$3,250 and three overcharge claims to railways aggregating \$2,719, accounting for the majority of the increased balance.

Electricity - This account balance decreased \$6,276 during July and is primarily the result of a decrease in the amount billed, since the accounts billed during July were generally those other than electrical-heated housing.

ACCOUNTS RECEIVABLE UNIT, Continued

Disconnect notices were mailed to 759 telephone subscribers, and the service of eight subscribers was suspended due to nonpayment of bills. During the month 427 delinquent notices and 91 final notices were mailed to electricity customers. The service of two electricity customers was suspended due to nonpayment of bills.

Based on a review of Accounts Receivable open balances at June 30, 1956, a year-end adjustment of \$2,000 was required to establish a reserve adequate to cover expected losses from uncollectible accounts. The adjustment requested was to cover estimated losses from community accounts. As the reserve established for Kadlec Hospital at June 30, 1956, appeared to be adequate, an adjustment was not requested, nor will the normal bad debt accruals be made during the months of July and August, 1956.

Accounts Receivable statistics are summarized as follows:

<u>Account</u>	<u>Balance</u> <u>6-30-56</u>	<u>Net</u> <u>Charges</u>	<u>Collec-</u> <u>tions</u>	<u>Balance</u> <u>7-31-56</u>	<u>Active</u> <u>Accounts</u>
Kadlec Hospital					
Active	\$ 80 488	\$ 54 913	\$ 56 781	\$ 78 620	1 694
Collection Agencies (70 accounts)	5 818	49	10	5 857	
Electricity	33 960	57 523	63 799	27 684	3 850
Telephone	28 166	57 512	56 458	29 220	6 910
Sundry					
Active	27 046	25 593	18 566	34 073	264
Collection Agencies (112 accounts -a)	6 748	54	717	6 085	
AEC Cost-Type Contractors	53 687	77 434	52 923	78 198	31
Rents	37 130	377 668	377 492	37 306	6 607
Equipment Sales to Facilities (1 account)	17 101		349	16 752	1
Safety Shoes	1 520	1 857	2 306	1 071	201
Loans to Employees (5 accounts)	<u>933</u>	<u>150</u>	<u>23</u>	<u>1 060</u>	<u>5</u>
Subtotal	\$292 597	<u>\$652 753</u>	<u>\$629 424</u>	\$315 926	<u>19 563</u>
Reserve for Bad Debts	<u>(34 172)</u>			<u>(34 737)</u>	
General Ledger Balance	\$258 425			<u>\$281 189</u>	
Debit Balances Transferred from Accounts Payable	<u>35 337</u>				
Adjusted General Ledger Balance	<u>\$293 762</u>				

(a - Includes all utility and rental accounts.)

ADMINISTRATIVE PLANNING

A total of 23 new or revised Organization and Policy Guides were issued during July. Of these, seven were Instruction or Policy Guides; 16 were Organization Guides. In addition, 11 were in the process of duplication or distribution at the end of the month. The seven Instructions are:

04.3	Excavation Permits
04.5.2	Property Management of Special Equipment
08.5	Printed Employee Communications
08.6	Priority Messages
13.7	Benefits for Employees Entering, and Re-Employment of Veterans Leaving, the Armed Forces
18.14.5	Employee Transfer and Payroll Status Change
21.8	Shipping, Receiving and Acceptance

A summary of Organization and Policy Guides issued during June was sent to all section and department managers.

A report was made summarizing AEC Transmittals received within HAPO during June, 1956.

One set of Instructions and 304 extra copies of OPGs were distributed.

CONTRACT REIMBURSEMENTS

At the end of July, approvals requested of the Commission to meet provisions of the revised Prime Contract totaled 39, of which AEC's action had not been received on six. Ten agreements had been entered into in accordance with contract provisions. Work continued on the remaining documents required to meet contract conditions.

Approvals received from the AEC in July were as follows:

<u>Approval No.</u>	<u>Subject</u>
25	Civil Defense Program for the Plant
33	Revisions to Salary Manual
34	Hiring Plan for Business and Technical Graduates
35	Assistance to Hanford--Authorization for Metallurgy Consultation (ATH-2-57)
37	Salary Adjustment--Department of Labor and Industries (State employee assigned to GE cases under Workmen's Compensation Agreement)
40	Disposal of contaminated Northern Pacific freight car

Agreements received in July were:

<u>Agreement No.</u>	<u>Subject</u>
6	System of Product Inspection
7	General understanding on work or services related to other programs of the Commission or of other Government Agencies, to be performed with administrative authorization from the AEC.

CONTRACT REIMBURSEMENTS, Continued

Agreement No.

Subject

8

Research and Development Program for the Fiscal Year 1957

Modification No. 4 to Appendix B to the Contract, providing for an increase in the per diem schedule for inspection and expediting personnel and certain other allowances was signed by the Commission. This is retroactive to March 9. Modification No. 5 covering revisions in Appendix B with respect to travel provisions for prospective employees and travel and moving expenses for new employees was submitted to the AEC.

The "Summary of Disbursements" for June, transmitted to the Director of the Finance Division AEC, showed net disbursements of \$6,656,143, as summarized below:

Payrolls and payroll deductions disbursed	\$4 958 818
Materials (including orders placed on requirements contracts) and freight	2 233 118
Employee benefits	125 834
Taxes and insurance	99 519
Subcontracts and agreements	95 817
Advances for travel and living expense	86 245
Miscellaneous	<u>63 379</u>
Gross Disbursements	7 662 730
Less: Revenue	<u>1 006 587</u>
Net Disbursements	<u>\$6 656 143</u>

The annual "Summary of Disbursements" for the fiscal year 1956, compilation of which was completed in July, listed net cash expenditures totaling \$85,920,550, as follows:

Payrolls and payroll deductions disbursed	\$54 813 336
Materials (including orders placed on requirements contracts) and freight	28 658 560
Employee benefits	3 802 203
Taxes and insurance	2 018 465
Subcontracts and agreements	965 159
Advances for travel and living expense	936 039
Miscellaneous	<u>1 077 331</u>
Gross Disbursements	92 271 093
Less: Cash Receipts	<u>6 350 543</u>
Net Disbursements	<u>\$85 920 550</u>

GENERAL BOOKS UNIT

HAPO books of account were closed on July 16, 1956 in accordance with the scheduled date. Adjustments of accounts were made in accordance with minutes of meeting held in Mr. A. M. Waggoner's office on April 19, 1956. Closing activity was well coordinated, with closing schedules being met in the most part well ahead of established dates.

The net result of account adjustments and clearing of over-under liquidations of cost was a \$461,300 credit to Production Costs at year-end. This credit resulted mainly from an overaccrual in Continuity of Service Expense Accrued of \$552,950 (due primarily to a \$572,000 refund from Metropolitan Life Insurance Company) and overliquidations of cost in the net amount of \$137,520, offset by increases to inventory reserves at year-end in the net amount of \$229,170.

Budgets for travel and living expense variation, conference expense, and attendance at meetings of professional and trade societies were established early in July to cover the first two months of FY 1957 prior to reorganization. Proposed budgets for FY 1957 were established in preliminary draft form and were discussed with the Managers of the reorganized departments. These proposed budgets are to be submitted to the General Manager for formal approval early in August. At September 4, costs incurred in July and August against the above-mentioned budgets will be recast to the new organizational components, and supporting documents will be forwarded to the respective Financial operations.

Considerable time was spent during the latter part of July in training and instructing personnel to be assigned work in General Accounting operations under reorganization.

Travel and living and conference expense reports processed in July totaled 133 as compared to 613 reports in June. This decrease is largely due to the booking in June of all travel expense incurred in FY 1956 prior to closing of the books for the year. Normally, there is a considerable lag between the time trips are taken and final booking and reporting of travel expense.

Cash and travel and living expense statistics for the month of July, along with the previous month's figures are shown below:

	<u>July</u>	<u>June</u>
Advances from AEC		
Balance at beginning of month	\$1 906 399	\$2 112 542
Advances received from AEC	6 900 000	6 450 000*
Other cash receipts	391 948	1 006 587
	<u>9 198 347</u>	<u>9 569 129</u>
Less disbursements	<u>7 061 442</u>	<u>7 662 730</u>
Balance at end of month	<u>\$2 136 905</u>	<u>\$1 906 399</u>
Advances requested for subsequent month	<u>\$7 500 000</u>	<u>\$6 900 000</u>

GENERAL BOOKS UNIT, Continued

	<u>July</u>	<u>June</u>
Travel and Living Expenses		
Travel Advances to employees		
Balance at beginning of month	\$ 32 176	\$ 66 499
Advanced to employees	<u>65 438</u>	<u>86 245</u>
	<u>97 614</u>	<u>152 744</u>
Less:		
Travel, living and conference expenses		
reported by employees	22 245	110 817**
Cash refunded by employees	<u>12 870</u>	<u>9 751</u>
	<u>35 115</u>	<u>120 568</u>
Balance at end of month	<u>\$ 62 499</u>	<u>\$ 32 176</u>
Outstanding Travel Advances to Employees		
Current	\$ 24 528	\$ 27 577
Outstanding over 15 days	<u>37 971</u>	<u>4 599</u>
Total	<u>\$ 62 499</u>	<u>\$ 32 176</u>
Number of expense reports submitted by employees	133	613

* Includes \$600,000 in transit as of May 31, less the amount of \$300,000 originally requested and cancelled the last week in June.

** Does not include retroactive adjustment to March 9 of reimbursement from the Commission for certain expenses of off-site inspectors and expeditors.

PERSONNEL ACCOUNTING SECTION
MONTHLY REPORT - JULY 1956

Salary checks and deposit slips for monthly paid employees were prepared for the first time in July with electronic data processing equipment. The checks, deposit slips, and stubs were redesigned for use with this equipment.

Salary rates for all non-exempt employees except community firemen, technical graduates, and business graduates were changed to reflect an increase of 1.18% adder factor in accordance with the cost-of-living features in the company's Better Living program. The revised rates were effective July 30 and will be reflected in weekly salary checks for the first time on August 10. Concurrent with the increase in salary rates, employees who are eligible to receive isolation pay or area differential, will receive increased isolation pay to reflect the cost-of-living adjustment.

Modification No. 4 to Appendix "B" was approved by the AEC. This modification concerns travel and living expenses for employees who are assigned work away from the Plant area on a resident or temporary basis.

A schedule of 665 employees who may become eligible for an annuity certificate prior to August 31, 1957 was forwarded to Banking and Corporate Finance Services for transmittal to Connecticut General Life Insurance Company. These certificates are purchased for former duPont employees who transferred to G. E. at Hanford on September 1, 1946, and are issued to the employee upon completion of 15 years combined duPont and General Electric Company service.

The initial monthly report on frequency of absenteeism was issued during July. Frequency rates were computed for all departments and sections, and showed a segregation between absence for personal illness and absence for other personal reasons. Some suggestions were received as to how the report could be improved, and each of these suggestions is being investigated to determine its feasibility.

Participation in the Pension Plan is currently 99.0% of the employees eligible to participate.

A time recorder was installed at the west gate of the 700 area to provide an additional time-clock at that location. This addition brings the total time recorders being used on the project to 48.

PERSONNEL ACCOUNTING SECTION

July, 1956

STATISTICS

<u>Number of HAPO Employees</u> <u>Changes During Month</u>	<u>Total</u>	<u>Monthly Payroll</u>	<u>Weekly Payroll</u>
Employees on Payroll at Beginning of month	9 418	2 364	7 054
Additions and Transfers In	132	17	115
Removals and Transfers Out	(93)	(11)	(82)
Transfers from Weekly to Monthly Payroll		16	(16)
Transfers from Monthly to Weekly Payroll		(3)	3
	<hr/>	<hr/>	<hr/>
Employees on Payroll at End of Month	<u>9 457</u>	<u>2 383</u>	<u>7 074</u>

	<u>JULY</u> <u>Amount</u>	<u>JUNE</u> <u>Number</u>	<u>Amount</u>
<u>Overtime Payments During Month</u>			
Weekly Paid Employees	\$86 842-a)	6 896	\$80 379-b)
Monthly Paid Employees	<u>14 811</u>	<u>209</u>	<u>14 147</u>
Total	<u>\$101 653</u>	<u>7 105</u>	<u>\$94 526</u>

<u>Gross Payroll Paid During Month</u>	<u>JULY</u>	<u>JUNE</u>
Engineering	\$ 796 109	\$ 853 101
Manufacturing	2 563 679	3 124 585
Other	<u>1 182 491</u>	<u>1 377 241</u>
Total	<u>\$4 542 279-a)</u>	<u>\$5 354 927-b)</u>

(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>Participation in Benefit</u> <u>Plans at Month End</u>	<u>Number Participating</u> <u>July</u>	<u>June</u>	<u>Percent Participation</u> <u>July</u>	<u>June</u>
Pension Plan	8 707	8 691	99.0%	99.0%
Insurance Plan				
Personal Coverage	9 487	9 458	99.6	99.6
Dependant Coverage	6 740	6 734	-	-
U. S. Savings Bonds				
Stock Bonus Plan	5 149	5 139	54.4	54.6
Savings Plan	1 028	1 030	10.9	10.9
Both Plans	5 593	5 597	59.1	59.4

<u>Pension Plan</u>	<u>July</u>	<u>June</u>
Number retired	-	12
Number who became eligible for participation	77	143
Number who applied for participation	75	131
Number who elected not to participate	2	12
Replies not received	-	-
 <u>Insurance Plan - Number of Claim Payments</u>		
Employee life insurance	3	2
Employee accident and health insurance	453	418
Dependant accident and health insurance	627	480
 Total	<u>1 083</u>	<u>900</u>
 <u>Good Neighbor Fund</u>		
Number participating	6 737	6 721
Percent participation	71.2%	71.4%
 <u>Suggestion Awards</u>		
Number of awards	30	192
Total amount of awards	\$1 355	\$2 405
 <u>Preferential Rates</u>		
Number (eliminated) or added	(2)	(4)
Number currently in effect	467	469
 <u>Number of Military Allowance Payments</u>	1	1

PROCEDURES AND COMPUTING SECTION

JULY, 1956

GENERAL

The Power and Exposure Studies calculation was converted to the 702. Data for the period September 1955 through April 1956 was run to accumulate tube-by-tube exposure in all reactors, and to report exposure of discharged tubes. Approximately one hour 702 time is required to process one month's data for all reactors. The results are presently being used in a special operations research study.

A parallel run of the Monthly Payroll procedure for June was made on the 702. This run included attendance, file maintenance, calculation, check writing, and statistical data. Corrections to the program are now being made in preparation for processing July's Monthly Payroll.

The Classified Files daily processing and inventory procedure was placed on the 702 during the last week in June. Approximately 60 hours of 702 time were required to create the master tape files. One and one-half hours are used to do a normal day's business.

Programs for the Quarterly and Annual AEC Vehicle Reports were written, and the reports issued.

A 20,000-position magnetic core storage was installed on the 702 July 19 through 22. The new storage is more reliable and has twice the capacity of the electrostatic storage which it replaced. This will increase the speed of certain applications, make others easier to program and reduce memory failures.

NUMERICAL AND PROCEDURAL ANALYSIS

The Power and Exposure Studies calculation was converted to the 702 in July. Data for the period September 1955 through April 1956 was run to accumulate tube by tube exposure in all reactors, and to report exposure of discharged tubes. Approximately one hour 702 time is required to process one month's data for all reactors. Report passes are now being designed.

Reactor tube discharge records prepared in the Power & Exposure Studies calculation are presently being processed by the 702 to create reports requested by the Operations Research Section in connection with their rupture analysis study. The output of these production runs includes the listing of a new master file of nearly seventy thousand tube discharge records, frequency distributions of certain variables, and the results of mathematical analyses of groups of discharges formed by classification according to certain pertinent factors.

The effective Reactivities problem is being programmed to utilize the packed form of entering temperature maps into the 702. The new program is about 70% complete, and is expected to reduce the processing time by approximately 40%.

Fitting the 27 high and low trip limit curves has been completed for the anticipated revision of TBI Limit Calculations, and cost estimates for preparing routine reports have been submitted to the customer.

NUMERICAL AND PROCEDURAL ANALYSIS (continued)

Correlations are being run on the 702 in an effort to determine the most satisfactory functions for use in predicting slug corrosion rates from given conditions. Eight functions are to be evaluated from approximately 2000 sets of data. The results of these evaluations are to be correlated with other variables, such as surface temperatures, slug powers, etc. The first production run is expected to be made early in August.

A 702 run was made early in July, predicting process tube wall thickness for 24 months in the future, using temperature data back to pile startup and improved prediction equations. The results were in the form of statistical distributions; later calculations will give tube-by-tube results.

200,000 cards of wind data have been sorted, and data for 1954 and 1955 have been transcribed to magnetic tape. Paper tapes, prepared on the 884 machine, of data from early 1955 to date, have been transcribed on the 046 to punched cards, and will be put on magnetic tape presently.

Portions of the Biological Analysis work have been reprogrammed to take advantage of the doubled memory now available on the 702.

A statistical report on product purity, running successfully on the 702, will be reprogrammed for the type 650 Magnetic Drum Calculator which is scheduled to arrive next month. This move will take some pressure off the work load of the 702 and will provide training in similar problems of conversion.

A survey of the reactor section on radiation attitudes was conducted, and the responses tabulated on the 702. Each of 55 questions was tabulated for each of the five subsections of the reactor section.

A parallel run of the Monthly Payroll procedure for June was made on the 702. This run included attendance, file maintenance, calculation, check writing and statistical data. Corrections to the program were made as a result of the parallel run, and the Monthly Payroll for July was run successfully on July 26.

Revisions to the Weekly Payroll procedure were made to accommodate the recent cost-of-living adjustment. The same revisions will be used for the forthcoming adjustment under the union contract.

Job requests were prepared for supplying necessary information from Salary Administration files for exempt payroll 702 conversion and for the production of files of both exempt and weekly personnel on mark sense stock for use as an index of proposed force transfers.

The Classified Files daily processing and inventory procedure was placed on the 702 during the last week in June. Approximately 60 hours of 702 time were required to create the master tape files. One and one-half hours are used to do a normal day's business. The inventory pass is presently being reprogrammed to provide better accuracy and more efficient machine utilization.

Transcription of property records and the recording of changes which have been made during the past year has resulted in IBM card files which are ready for use as input to the 702 property accountability system. Programming on the system is in progress.

Purchasing and Stores section has requested a revision and expansion of the Purchase Order Analysis procedure to become effective on September 1, 1956. This request was

NUMERICAL AND PROCEDURAL ANALYSIS (continued)

reviewed and discussed with the requestor. An appraisal of the request, a suggested form for source analysis and recommendations for procedurizing and programming the requested revision were prepared. A special listing will be made to enable liquidation of the Purchasing function by value of orders placed, effective September 1.

Planning was continued on the installation of machine procedures for Stores spare parts and general supplies data processing. For the spare parts phase, this work included work on the descriptive file, and customer training on the 884 tape preparing typewriter. This training will continue until October 1, at which time equipment and supplies will be available to start the data processing procedure. A major revision has been proposed in the general supplies phase of this problem. Customer training on the 884 has been started.

The code written for the optimization of outlet temperatures has been modified slightly and this, together with the combination of some parameters, will reduce the machine time required from an estimated 4 hours to 1.5 hours.

In the future, the 100 Area Accountability Unit will furnish a breakdown of discharge dates of material which is shipped from the 200 Area. It will then be possible to trace the history of such material back to time and place of irradiation.

The data on material shipments to Idaho have been compiled by months for all shipments to date and a 702 program has been written which will produce an Idaho Short Report to be submitted to AEC.

Work was continued on the table look-up routine to replace the Bessel function subroutines. The latest development is concerned with the possibility of including the Bessel function J_0 , J_1 , I_0 , I_1 , Y_0 , Y_1 .

A request has been received from the Experimental Physics Unit to investigate the possibility of putting all experimental buckling calculations on the 702, with related harmonic corrections included. Provision is to be made for all possible changes, both "seeable" and "unseeable". Input will be raw data; output, everything now calculated by the customer.

RECORDS OPERATIONS

Quantity of records received, processed and stored:

Employee and Public Relations Department	78	Standard Storage Cartons
Engineering Department	96	" " "
Financial Department	328	" " "
Manufacturing Department	101	" " "
Radiological Sciences Department	5	" " "
	<u>608</u>	

Records Retention and Disposal Schedule Number 231, "Stores and Excess Operations Records" consisting of eleven individual records and Number 232, "Purchasing and Traffic Operations and Administrative Records" consisting of twelve individual records were developed and submitted for internal approval. Records Retention and Disposal Schedule Number 230, "Plant Manufacturing Management, Production and Engineering Records" consisting of ten individual records was submitted to the Atomic Energy Commission for approval.

COMPUTING OPERATIONS

The 20,000-position magnetic core memory has been installed in the 702 EDPM, replacing the original electrostatic memory. The installation was completed in less than four days. From all indications, the magnetic core memory has eliminated the most frequent type of machine error. In the last two weeks, there has not been a single memory error. With the electrostatic memory, this type of machine failure was occurring several times each day.

The 650 Magnetic Drum Data-Processing Machine will arrive the first week in September. Work on Omnicode, an automatic programming system for the 650, is nearing completion. Complete specifications for the system have been agreed upon and the detailed coding is approximately two-thirds completed. A 650 training program has begun with an eight-hour survey course offered to personnel in the Procedures and Computing Section and an 80-hour course scheduled for persons directly concerned with 650 programming. The 80-hour course will cover detailed programming techniques, control panel wiring, optimum programming, and the use of Omnicode.

During the month of July, the following non-routine assignments were completed for customers:

Employee and Public Relations	3
Engineering	3
Financial	29
Manufacturing	1
Operations Research	1
Radiological Sciences	1
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ANNUAL SUMMARY

PROCEDURAL ANALYSIS

Forms Control:	<u>Year</u>	<u>Average/month</u>
Orders Reviewed	5,127	427
Orders Rejected	236	20
Forms Designed	1,135	95
Number of approved forms (less IBM card forms, IBM continuous forms and envelopes)	12,477,692	1,039,808
Forms Obsolete	353	29

During the year most of the effort of the employees of the Procedural Analysis Unit was expended in the converting of punched card procedures to EDPM procedures. The conversions consisted of analyzing the punched card procedures and flow charting them, designing EDPM procedures and preparing flow charts to show the new procedures, writing detailed programs (instructions) for the 702 and debugging these programs, and installing the new EDPM procedures on the 702. All major punched card procedures were converted during the year.

The first procedure to be converted to the 702 was the Weekly Payroll, which was converted in August 1955. This was followed by Office Machines, Vehicle, Bond Purchases, Store Orders, Salary Distribution, Work Orders, and Classified Files. The last procedure, Classified Files, was converted in June, 1956. Several minor procedures were left on the punched card equipment as it was thought to be uneconomical to convert them to EDPM because of the small amount of processing time required in the punched card equipment.

PROCEDURAL ANALYSIS (continued)

Procedures to prepare overtime reports were established to show the year-to-date overtime hours paid for each individual. Programs were written to prepare this information on the 702 as a by-product of the Weekly Payroll Procedure. The individuals working on the same type of work were grouped by job classification and work location and reported to supervision. The reports are being used by supervision to equitably distribute overtime work among the employees.

An accountability listing was prepared showing all the documents that have been sent to the Yellow File. This entailed a search through several hundred thousand document accountability cards.

A new procedure was developed for the processing of Stores Orders and was installed concurrent with the conversion of Store Order procedures to the 702. A master file, containing the stock numbers and unit prices of all General Supply Items, was set up on magnetic tape. This allowed the pricing of Stores issues to be done automatically on the 702 and eliminated the posting of prices from the Kardex records to the Store Order.

Two courses were prepared and presented to plant personnel pertaining to the use of Industrial Engineering techniques in the solving of paper flow problems. One course, given to four groups, consisted of the principles and application of work simplification as applied to the special interest of each group. The other course pertained to the use of Industrial Engineering "Common Language Tools". Examples of the use of each working tool were given and were supported by specific reference material. In all, the courses were given to approximately 310 employees.

As a result of the new contract with the various Labor Unions, major revisions had to be made to the Weekly Payroll procedures. These changes were both to rates and to the methods of calculation, and were made effective retroactively. This required the preparation of special programs and procedures to compute the amount of retroactive payment for each individual. The programs were prepared and processed on the 702 in much less time and at a smaller cost than would have been feasible on the punched card equipment.

RECORDS OPERATIONS

9,841 cu. ft. of records were disposed of by approved Records Retention and Disposal Schedules during the year. This represents 44% increase over 1955 disposals.

Overall records holdings decreased 2,668 cu. ft. which represents 5% decrease as compared to 1955 holdings. Records holdings in Records Service Center decreased 1,008 cu. ft. which represents 3% decrease as compared with 1955 holdings. 7,173 cu. ft. of new records were created during the year as compared with the disposal of 9,841 cu. ft. The comparison of records disposed versus the creation of records shows 137.2% disposal versus growth.

14 Functional Records Retention and Disposal Schedules containing 469 individual records were developed as compared to 15 schedules containing 369 individual records in 1955.

A revised Uniform Filing Manual was issued.

Assistance was furnished 271 individual offices in converting files to revised manual.

RECORDS OPERATIONS (continued)

Thirty combination-lock cabinets were replaced with key-lock cabinets. Sixty-nine requests for file cabinets were cancelled through review of equipment usage.

NUMERICAL ANALYSIS

The calculation of reactor operating limits was placed on the 702 in November, 1955, and is presently being done for all reactors on a routine basis. Approximately 20 minutes are required to process temperature and panellit data from a single reactor, and produce a panellit base report, individual tube flows, and tube temperature limits. The present calculation is based on the latest in a series of limits used to monitor reactor operation, and will undergo revision in the near future to reflect recent advances in reactor technology.

A program was developed to assist reactor operating personnel in making reactivity accounting calculations during transient operation. The program makes use of tube flows calculated in the operating limits procedure, and has been run successfully a number of times for two reactors. An important feature of this program is the condensation of reactor tube data into approximately one-twentieth as many punched cards as previously required. This technique is being used in a number of similar applications.

Processing of tube temperature data from the KE experiment was halted temporarily in January, 1956, with the experiment approximately 1/2 complete. Plans were made to enlarge the scope of the problem in converting to the 702, but eventually discarded in favor of converting straight across. The conversion is nearly complete.

The development of EDPM procedures for the KE experiment, which is an experiment in reactor data processing, has provided valuable information for the study of an integrated system of reactor data processing. Such a system would centralize the processing of all reactor data and eliminate much of the prevailing duplication in reactor data recording and reporting. Study of an integrated system was initiated in September, 1955, and will be completed shortly with the issuance of a document summarizing the requirements of the affected organizations, and recommending methods for recording and transmitting raw data to the centralized data processing facility.

Considerable activity was experienced during the year on the reactor tube corrosion problem. During July, 1955, a calculation was made of corrosion loss in all standard reactors over the period May, 1954 to May, 1955. The results were based on temperature data from the Power & Exposure study, and were corrected in August to account for tube replacement and individual reactor operating characteristics. In October, similar calculations were made to predict tube wall thickness at monthly intervals for the ensuing year. Shortly thereafter, a more accurate method for computing and predicting corrosion loss was devised, and plans were laid for an extensive study of corrosion loss in all reactors since original startup. Approximately one temperature map per month per reactor was transcribed to magnetic tape for input to programs which would estimate certain parameters in the corrosion equation, and calculate corrosion loss. The first production run was made in March, 1956, and calculation of corrosion loss from startup to May 1, 1956 was completed in May. Finally, in June, predictions were made of tube wall thickness at monthly intervals for the coming two years. Similar corrosion calculations will be made periodically in the future.

The Power and Exposure Study calculation was converted to the 702. Data accumulated since August, 1955, were run in July, 1956, and the results are being used in a special study of slug rupture.

NUMERICAL ANALYSIS (continued)

In July of 1955, work was started on the development of a comprehensive system for the processing of meteorological data on the 702. Plans called for the summarization of five-year's weather and wind data, and the subsequent issuance of monthly reports. Involved in the study were 60,000 punched card records of weather data, and 200,000 cards of wind data, which were transcribed to magnetic tape. The majority of these records have now been edited on the 702. Wind data is presently being recorded in the form of punched paper tape, and converted to punched cards at the central data processing installation. A considerable backlog of these data remains to be processed before the routine is current.

One of the first computational problems to be attempted on the 702 was the linear programming problem, requiring the solution of large systems of linear inequalities. During July, August, and September of 1955, this technique was applied to the production scheduling problem, and the performance of the 702 was found to be highly satisfactory. Systems with orders in the hundreds were run in times comparable to those obtained on scientific calculators in a class with the 702. This work has aroused widespread attention, and copies of the program have been circulated.

The success of the 702 as a computer has been amply demonstrated during the past year. Speed factors of from 40 to 80 over punched card calculational methods were easily obtained, thus placing the 702 in an economically competitive position with other large-scale computers. Calculations were made on the 702 in the fields of exponential pile research, reactor physics and design, radioactive buildup and decay, fuel element characteristics, corrosion, shielding, and chemical processing development. Some notable examples are:

Xenon Tables: Tables for computing xenon poisoning in a reactor were prepared on the 702 in July, 1955. The actual calculation took twenty minutes on the 702. Earlier work of comparable scope required ten hours on the card-programmed-calculator.

Organic Diffusion: A parametric calculation was made in August, 1955, of the theoretical concentration of solvents in a two-phase separation column. The calculation was made to verify the adequacy of a particular mathematical model of the column, and did much to clear up discrepancies noted between the theoretical and actual behavior of the column.

Three-dimensional Pile Control Problem: A three-dimensional model of a Hanford reactor was postulated with reacting properties of all but one region known. The problem: to find the reacting properties of the unknown region which will make the reactor critical. Variational techniques were used to solve the problem, which has significant implications from the standpoint of reactor safety. The 702 program for this problem made extensive use of the magnetic tape facility of the 702.

Special Slug Design: Certain models of cylindrical fuel elements are desirable for their mechanical or thermal stability, but determining their reacting properties is an extremely lengthy calculation by hand. In October 1955, a program was developed which would calculate these properties for a highly generalized slug design, which for individual calculations could be particularized by specifying a set of parameters. Since the development of this program, over 600 different cases have

NUMERICAL ANALYSIS (continued)

Special Slug Design (continued)

been run. The interest in this program has been so widespread that a special form was printed to facilitate entering of parameters. Results for a given design can be obtained in three minutes 702 time.

Successive Generations: A theoretical physics calculation of neutron-collision probabilities was undertaken in September of 1954, and a small portion of the calculation carried out on the card-programmed-calculator. Because of the complexity of the calculation, it was decided to defer the balance of the calculation until it could be done on the 702. The calculation was completed in March, 1956, with a 25-hour run on the 702. An estimated \$10,000 was saved by completing the calculation on the 702.

It is anticipated that a large portion of scientific calculation will, in the future, be done on the 650. However, there will still be problems which, because of their size, can be run more economically on the 702. The scientific computing program at Hanford appears to be growing without limit, and consideration is presently being given to the use of off-site scientific computers for large problems.

COMPUTING SCHEDULING

The monthly reports processed in the Procedures and Computing Section were balanced and checked for delivery to the customer an average of two hours earlier than delivery time during the 1955 fiscal year. There were over 900 different reports processed each month for the customers.

A number of routine jobs have been placed into operation in the last twelve months. The larger ones are as follows: TBI Reports for all reactors, Employee Overtime Report, Plant Accounting, Vehicle Overnight Parking, Power and Exposure Reports, Bond Distribution, Plant Accounting and Exempt Payroll Attendance Report. In addition to our routine work, we completed 532 non-routine jobs for our customers during the year.

The Section had 7,757 hours of free IBM machine time, this being where the operators were paid overtime without additional rental for use of the machines. A total of 3,675,000 cards were punched and verified in the Scheduling Unit.

Classes were given to Scheduling personnel on the IBM 702 machine and EAM equipment.

A working system for the disposal of IBM cards was placed into operation.

The Scheduling Unit operated on a smaller personnel budget for 1956 over 1955 fiscal year, although the volume of work was greater than at any prior time.

COMPUTING OPERATIONS

The installation of an IBM 702 Electronic Data Processing Machine at Hanford has enabled the Procedures and Computing Section to provide computing and data processing services, many of which were not feasible with conventional punched card equipment. Prior to the installation of the 702, twenty-one persons were required to operate the punched card machines. With the 702, the operating staff has been reduced to eight.

COMPUTING OPERATIONS (continued)

During the year, every major application had been converted from punched card equipment to the 702. These include:

- Weekly Payroll
- Salary Distribution
- Work Order Cost
- Classified Files
- Vehicle
- Office Machines
- Stores
- Reactor Power and Exposure
- TBI
- Meteorological Data Reduction

In addition, several new applications have been mechanized and are processed on the 702:

- Exempt Payroll
- Plant Accounting
- Regional Survey Radiation Sampling

These routine data processing applications account for a major portion of the available 702 time. There has, however, been a steady and rapid increase in the number of requests for non-routine scientific or engineering computations. The combination of data processing and computing work has caused the 702 load to approach the maximum.

To help alleviate the situation, an IBM 650 Magnetic Drum Data Processing Machine has been ordered. It is anticipated that the 650 will relieve from ten to twenty percent of the total 702 load, primarily in the area of non-routine scientific computing. The machine is scheduled to arrive in September.

Careful consideration has been given to increasing the capacity of the 702 system. The machine which was installed a year ago contained 10,000 positions of high-speed electrostatic memory, 60,000 positions of magnetic drum storage, eight magnetic tape units, card reader, card punch, and two printers. Since then another tape unit has been installed; a high-speed printer (1000 lines per minute) has been ordered; and a 20,000 position magnetic-core memory has replaced the electrostatic memory. The new memory has proven extremely successful. In addition to doubling the high-speed storage capacity of the 702, it has greatly reduced the number of machine errors.

Considerable work has been done by the Procedures and Computing Section in the development of automatic programming methods for the 702. A general purpose automatic programming system called SCRIPT was developed to reduce the cost and time of writing programs for the machine. It is estimated that SCRIPT has saved 60 man years of programming time in the last year.

Work has begun on a new automatic programming system for both the 702 and 650. This system, called Omnicode, will enable the programmer to write instructions to the machine directly in the English and mathematical language of the application without regard to the computer being used.

PROPERTY ACCOUNTING SECTION

July, 1956

PROPERTY ACCOUNTABILITY UNIT

During the month responsibility for affixing identification tags to cataloged property was transferred to property custodians. Responsibility for control of the assignment of numbers to property was transferred from Property Accountability Unit to Capitalization and Depreciation Unit. A pickup truck used in the tagging operation was returned to Transportation since it was no longer required.

At the close of the month, all uninstalled commodity groups except laboratory, civil defense, fire fighting and special construction equipment had been converted to machine operation. The latter consisted of about 1750 items, of which about 1000 were laboratory equipment which required coding. Taking this into consideration, at the close of the month mechanization was approximately 95% complete.

Due to the urgency of updating all records for reorganization purposes to reflect July balances, further transcriptions of property to mechanized operation were discontinued the last week in July and efforts were directed toward updating all accounts. This was necessary in order to meet the closing deadline of August 11, 1956.

At the close of July, accounts previously converted to machine operation, with the exception of shop and laboratory equipment, had been updated through June vouchers. Shop was in process of being posted from February forward and no posting had yet been accomplished on laboratory equipment.

During the week of July 16, Procedures and Computing reassigned two programmers to work in the property accountability system; however, no new target date for completion of programming was established.

The reconciliation of physical inventories for portable health instruments, railroad rolling stock, motor vehicles, and heavy equipment was completed and a report issued.

The reconciliation of Engineering and Radiological Department movable property is about 60% complete.

The reconciliation of T Plant movable equipment has been completed and a voucher issued transferring all this equipment to Plant and Equipment Held for Future Use.

Surveying instruments were established in a separate account and a property custodian designated.

The Landlord Report - Housing, for fiscal year 1956, showing first costs, annual depreciation charges on buildings, Government owned commercial facilities, non-commercial facilities, miscellaneous buildings and systems was prepared and forwarded to Community Cost Unit.

PROPERTY ACCOUNTABILITY UNIT (Continued)

Tentative procedures for taking of physical inventory of Kadlec Hospital prior to turn-over to the Methodists were presented at a meeting on July 26.

Fiscal year ending reports were submitted to AEC in accordance with schedules established.

CAPITALIZATION AND DEPRECIATION UNIT

Property listings were prepared in final form and forwarded to the six new department and operation managers showing facility assignments that will be effective after reorganization. The cost of these facilities will be segregated and available by department and operation about September 1, 1956.

A complete definition of all plant and equipment accounts at HAPO level was completed during July. This program involves the presentation of the purpose of each account and a listing of all units of property to be contained in the account.

The General Facility functional classification of property will be eliminated when the new plant and equipment account structure goes into effect on September 1, 1956. The elimination of this classification will result in simplification of the system of plant and equipment ledger controls, record maintenance, and reporting.

The Property Catalog is now being prepared. The index to the catalog consists of an alphabetical listing of all uninstalled equipment by noun, cataloged or uncataloged status, standard name, commodity code class number, and commodity code name identification. Complete identification showing class, name, kind, type and size of each unit of cataloged property will be prepared by Procedures and Computing as a result of the mechanization program that has been carried on for several months.

An analysis of our current TBP tonnage depreciation rate indicates that it is too low. A proposed revision to the tonnage rate has been submitted in order to recover the unamortized cost of the TBP Process over the remaining tons of uranium to be processed.

The balance in the Unclassified Property account pertaining to projects is \$258,000. This balance represents costs of equipment that have been transferred to projects that are currently under construction.

INVENTORY ACCOUNTING UNIT

Final results of the physical inventory of construction and operations excess materials and equipment in the custody of Stores Sub-Section revealed a net overage of \$1021. A review of custodial records indicated that the overage consisted of items which were part of lot bids sold at public sale and unclaimed by the buyer. Total value of materials and equipment inventoried was \$890,346.

Final results of the physical inventory of special materials (excluding graphite) in the custody of Engineering, Manufacturing and Radiological Sciences Departments disclosed a net shortage of \$309. This shortage, representing 0.08% of the book value, resulted primarily through failure to currently report platinum lost in process, in cleaning, or unrecoverable because of the high degree of contamination.

INVENTORY ACCOUNTING UNIT (Continued)

Approximately 99.5% of the materials were either actually weighed or physically observed during this inventory, as compared to 96% in 1955. Total value of materials inventoried was \$365,462.

The physical inventory of essential materials (excluding coal and fuel oil) in the custody of Manufacturing Department was conducted during July. Reconciliation of physical to book value is currently in progress and a report of results will be issued upon completion.

Field work in connection with the physical inventory of road materials in custody of Transportation and Community Sections was completed July 26, 1956. Reconciliation of physical quantities is currently in progress.

Progress continues on the reconciliation of the physical inventory of general supplies under Stores' jurisdiction. A review is presently being made to determine reasons for variances between the physical count and custodial stock records.

Preliminary preparations for conducting the physical inventory of automotive and heavy equipment parts, railway equipment parts and anti-freeze in custody of Transportation Section were completed. This inventory is scheduled to be taken August 7 and 8, 1956.

The inventory and excess reserve accounts were adjusted at year end to the predetermined percentages of asset values reflected at June 30, 1956. These percentages were agreed upon by GE and AEC.

PROPERTY MANAGEMENT UNIT

In connection with the reorganization, the Property Management OPG's to be issued at the HAPO level have been rewritten and circulated for comment. Also, each of the proposed new departments have been furnished with a rewritten set of recommended Property Management OPG's or Advices for issue at the department level.

Forty-six requests for the disposal of property were investigated and processed during the month.

A total of sixteen appropriation requests were investigated and processed during the month.

APPROPRIATIONS UNIT

A list representing proposed reassignment of primary management responsibility of construction projects under the decentralized organization was submitted to Department Managers for review and comments. A revised list incorporating recommendations made by the Department Managers will be prepared for final review and issuance by W. E. Johnson.

Thirteen project proposals and informal requests representing an aggregate of \$1,421,050 were reviewed, approved, and processed to the Commission during the month. After receipt and analysis of AEC Directives and Work Authorities, nine project authorizations were issued for a total of \$619,500.

The following Plant and Equipment projects were processed through the Appropriations Unit during July. GE and AEC approval action was as indicated below.

Project Number	Title	Amount of This Request	Totals	Date to AEC	Disposition
CA-546 Rev. 4	Fuel Element Pilot Plant	\$ -	\$ -	7-24-56	AEC Review Board Meeting 8-2-56.
CG-584 Rev. 1	Moisture Monitoring System for Detection of Leaking Process Tubes - 105-C	13,000	72,000	7-9-56	HW-332, Mod. 1, dated 7-30-56 auth GE \$69,000.
CG-600 Rev. 2	100-C Alterations	90,000	765,000	6-28-56	Approved by AEC Board 7-26-56.
CA-625 Rev. 1	Additional Waste Disposal Facilities - 200 Area	Red. to	55,000	6-13-56	AEC-56, Mod. 1, dated 6-29-56 red. AEC auth funds to \$55,000. Wk. Auth dated 7-9-56 red. GE auth. funds to \$55,000.
CG-644 Rev. 1	Silica Gel Tail-End Treatment Facilities - Purex	Red. to	33,000	7-24-56	AEC Review Board Meeting 8-2-56.
CG-653 Rev. 1	Modification - Redox Cooling Water Disposal	-	-	7-24-56	AEC Review Board Meeting 8-2-56.
CG-655	Crib Methods Selection Tests	100,000	100,000	1-25-56	HW-376 dated 7-20-56 auth GE \$100,000.
CG-666	Zone Temperature Monitoring - 100-B, C, D, DR, F & H	-	-	7-19-56	Approved by AEC Review Board 7-26-56.
CG-673	Replacement & Modernization of Plant Radio System	181,000	181,000	4-24-56	To be authorized from FY-57 Funds.
CA-675	Change House Facilities - 275-W Building	33,500	33,500	4-17-56	AEC-82 dated 5-9-56 auth AEC \$4,800 for design. Wk. Auth dated 5-21-56 auth GE \$2,300
CG-676 Rev. 1	Fuel Element Pilot Plant Semiworks	280,000	400,000	7-21-56	HW-382, Mod. 1 dated 7-24-56 auth GE \$400,000.

CG-678	Laboratory Facility for the Special Irradiation Studies	\$ 45,000	\$ 45,000	5-7-56	To be authorized from 1957 funds.
CG-680	Corrosion Testing Facilities - Building 314	140,000	140,000	5-18-56	To be authorized from 1957 funds.
CA-683	Relocation of Purex Cooling Water Swamp	333,000	333,000	5-21-56	AEC-83 dated 6-15-56 auth AEC \$20,000 for design. Wk. Auth dated 6-25-56 auth GE \$8,500.
CA-685	Alteration to Buildings 325 & 326	23,000	23,000	6-21-56	AEC Review Board Meeting 8-2-56.
CA-687	Evacuation Warning System - 300 Area	29,000	29,000	6-8-56	Returned unapproved by AEC 7-27-56.
CG-689	Slug Saw & Etching Equipment - 105-C Building	47,750	47,750	7-3-56	To be returned unapproved by AEC.
CA-690	Roof Repairs - 190-D, F and 186-D Buildings	28,000	28,000	6-21-56	AEC-86 dated 7-12-56 auth AEC \$28,000. Wk. Auth dated 7-20-56 auth GE \$4,500.
CG-691	Improved Task I and Task II Facilities - 234-5	175,000	175,000	7-9-56	HW-394 dated 7-25-56 auth GE \$175,000.
CG-692	Modifications to Redox Plutonium Concentration Building - 233-S	98,000	98,000	7-24-56	AEC Review Board 8-2-56.
CG-694	Auxiliary Oil Pumps - 190-C	80,000	80,000	7-24-56	AEC Review Board 8-2-56.
CG-696	Coal Car Shake-Out - 100-B, D, F, H and 200 West Areas	89,000	89,000	7-26-56	AEC Review Board 8-2-56.
AEC-158	Installation of Water Meters - Richland, Washington	607,800	607,800	7-31-56	AEC Review Board 8-9-56.
IR-210	Oil, Paint and Solvent Storage Facility - 300 Area	15,000	15,000	6-20-56	Returned unapproved by AEC 7-26-56.
IR-211	Purex Plant - Shelter for Regulated Docks	16,500	16,500	7-3-56	Approved by AEC Review Board 7-26-56.

IR-	Grounds Stabilization and Drainage - Central Stores Ware- house	\$ 14,000	\$ 14,000	7-31-56	AEC Review Board Meeting 8-9-56.
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SS ACCOUNTABILITY SECTION
MONTHLY REPORT - JULY, 1956

SUMMARY

The forecast of SS material requirements for the period October 1, 1956 through October 30, 1957 are currently being consolidated for presentation of the SS Allotment Forecast Report to the A. E.C. Due to the exacting A. E. C. requirements this consolidation constitutes the major activity of the Section.

UNIT ACTIVITIES:

Metal Preparation Area-SS Accountability Unit

Potential Recovery-SS Material

Discards of extreme dilute solutions of SS materials have been made over the years to the 300 Area waste pond. In practice, the "pond" dries due to soil filtration. Several months ago it was discovered that the normal uranium accumulation in the top 6" to 8" was significant and that penetration below 8" was negligible. This top layer has been scooped off and is being prepared for off-site shipment. Due to excess supplies of "ore" of this type, disposal of this material was temporarily abandoned some months ago to await a more favorable "market." We are now renewing our efforts to affect off-site transfer.

Transfer Series Completed

The final shipment in the current transfer to Phillips Petroleum Co., of Irradiated Enriched Uranium Aluminum Alloy slugs was made on July 12, 1956. Resumption of this program will be made next November at which time a continuous shipping program will result in complete liquidation of "J" slugs and a major liquidation of the "C" type slugs now in inventory. Breaks in the shipping schedule are determined by the cooling period required and by the favorable rates obtained in transportation under continued programs.

Slug Factor Weight

Average factor weights for Normal Uranium machined slugs received from National Lead of Ohio are subject to constant checks. We have noted a definite bias in recent receipts. Investigation is currently in progress.

A.E.C.-SS Accountability Personnel

Two representatives of the Division of Nuclear Material Management-USAEC visited the 300 Area on July 23, 24 and 25. The purpose of the visit being to review statistical applications to the SS Accountability system. In addition, they were conducted on a tour of the Metal Preparation Area Manufacturing facilities.

Segregation of Data

On the request of Manufacturing Cost, we have reactivated our segregation of data for cost analysis of solid and cored slug inventory movements. The request has been complied with and included some retroactive features.

Reactor Area - SS Accountability Unit

One of the major items of current interest is the reduction of Technological held irradiated metal. A program is currently in operation having as its objective the return of some 18 tons of metal from inactive status to production channels by September 1, 1956. As of that date inventories will be reduced to approximately 10 tons all of which will be associated with technical investigation projects. We are maintaining close observation of the rate of liquidation.

Reactor Area-SS Accountability Unit - continued

Transfers of Accounts

Previous reports listed the transfer of enriched uranium, thorium and U-233 accounts to the Reactor Area Unit. These transfers were made to place the Unit on an autonomous status and have now been completed.

Chute-Liner Accounts

Considerable account activity has developed in the 100-F Area cooling basin account due to a defective basin chute liner. Almost every discharge lists activity both in the form of recovery of previous hold-up or of new hold-up. Net accumulation remains nominal and appears to record the correct number of lodged slugs. Final reconciliation will be affected at the time of liner replacement.

Shipping Papers - Rala, Thorium and Enriched Uranium

In anticipation of decentralization the Reactor Area Unit is now preparing shipping documents as of August 1, 1956. This move will provide the Unit with an opportunity to gain experience prior to the assumption of full responsibility.

Separations Area-SS Accountability Unit

Redox Operation

Shutdown of this operation terminated on July 25 on a short term "high pu" program. We expect conversion to "low pu" on or about mid-August. The exchange will be of benefit to the SS Accountability controls in that it will be possible to establish a material balance across the program.

Recuplex-Inventory

Recovery operations transferred to the "high pu" material following the complete liquidation of "low pu" inventories.

T Plant

Decontamination of the 221-T canyon has been completed. It is expected that a similar status will be affected in 224-T by August. Final closing of the Bismuth Phosphate books will take place shortly thereafter. Up to the present time, recovery of equipment hold-up has been comparable to previous B canyon experience and has therefore been considered normal.

Button Receipts

The first shipment of "SR" buttons was received and processed. This represents a new program which is to continue for some time. Measurement problems associated with factor weights are currently being developed.

UO₃

Despite revisions in operation in the feeder plants UO₃ activity has continued at a high level of productivity. Bulk shipments are to be made in the near future and will materially reduce the paper work associated with shipping documents.

No further recovery was made from the material involved in the Montana UO₃ train wreck. Further recovery activity is however planned for the future.

RMA Line Accounts

In compliance with "Review" recommendations the RMA Line accounts are now maintained on the standard accounting system. Subdivision include "high" and "low" ledgers. All accounts are now on the standard accounting system originally installed in TBP-UO₃ process.

Reconciliation of physical inventory with the accounts is now being accomplished within reporting deadlines.

Separations Area-SS Accountability Unit - cont'd

Source Data

Following our collection of observed errors in source data a conference with custodians resulted in prompt action and a material improvement in the accuracy of data as originally submitted. Custodian cooperation was particularly gratifying.

A.E.C. Approval

Written approval has been received for the write-off of Redox-Pu loss in June, 1956.

Approved Write-Off

Under the new regulations effective July 1, 1956, deliberate process losses require prior A.E.C. approval in order to be booked as Removals. Pending A.E.C. action we are showing such losses as Book-Physical Inventory Differences (B-PID).

SS Measurements Unit

Reactivity testing of billet eggs has been discontinued as standard procedure. Future receipt of eggs will concern only special conditions and will be of limited quantity. Recommended use of factor weight be discontinued and future receipts be carried at actual weight.

Continued investigation into factors causing reduced weight of received bare slugs. Metal Preparation-Process Control did not notice significant dimensional changes but have not calculated the results for the period involved. F.M.P.C. has been contacted for any information they may have on the subject.

The subject is being pursued to attempt to determine if the change is of a permanent or temporary nature. If permanent, a canned slug factor weight revision will be in order.

SS Measurements Unit recommended to the Purex Control laboratory procedures whereby plutonium sample composites may be inventoried by multiplying the number of samples composited by a standard factor. Then when the composite has been completed after month-end, it will be measured, transferred and accounted for so as to form the basis for a B-PID statement.

Presently the inventory of the laboratory plutonium composite is determined from the summation of the estimated individual sample values.

In answer to a request, an estimated 200 West Area uranium balance was documented (HW-44704) - "Uranium Tank Farm Write-Off, West Area." Included was a recommendation that as soon as feasible the East Area vs TBP balance be submitted to USAEC-HOO for approval. It is felt that the available data is the best possible and that any delay on the part of the G.E. Co., in issuing a statement will only make it more difficult for AEC to appreciate the full significance of the situation.

SS Measurements Unit submitted current factors and procedures for calculating the reliability limits for normal uranium slugs. These procedures subtract out all major biases before the reliability limits are computed. This provides the most accurate method of reporting the 300 production inventory. Percentage wise, the inventory has a precision of $\pm 0.068\%$.

Consideration was given to a study to determine the precision of Separation Plants' dissolver charges on the basis of dissolver solution analyses, and a report was submitted stating that a study is unfeasible. Principle reasons are imprecision in the dissolver solution measurements, complication introduced by dissolver heels, and the difficulty of segregating charges through to the dissolver solution measurement point.

SS Measurements Unit - continued

Metal Recovery Sub-Section has accepted a recommendation that a Toledo Company representative be retained to check and overhaul the bulk scale on a quarterly basis. A contract is now being negotiated. Procedures for more frequent checks and calibration will be based on the recommendations of the representative.

Items which had a significant affect on June B-PID's were:

1. Retroactive adjustment to plutonium charges from the K reactors.
2. Yield of only 10 percent of book value on low MWD/T casting fragments.
3. Clean out of the Purex dissolvers.

Purex F factors were reviewed and a report was submitted. Recent error in the factor appeared to have been caused by low bias in the L-9 and L-10 AT analyses.

The measurements portion of the Redox plutonium manual was completed.

The program for eliminating UO_3 drum weight errors was summarized.

Arrangements have been made to have custodians of SS materials submit their 1st. quarter (FY 1957) review for consolidation. The forecast of SS material requirements for the period October 1, 1956 through September 30, 1957 are also due and are being collected for consolidation into the SS Allotment Forecast Report.

FINANCIAL DEPARTMENT PERSONNEL AND ORGANIZATION

JULY, 1956

	<u>Current Month</u>	<u>Prior Month</u>
<u>Personnel Changes During Month</u>		
Employees at beginning of month	510	504
Additions and transfers in	12	18
Removals and transfers out	(10)	(12)
Employees at end of month	<u>512</u>	<u>510</u>
 <u>Personnel by Unit at Month-End</u>		
<u>General</u>	<u>12</u>	<u>12</u>
<u>Auditing Section</u>	<u>17</u>	<u>17</u>
<u>Budgets and Measurements Section</u>	<u>13</u>	<u>12</u>
<u>Contract Cost Section</u>		
General and Consolidations Cost Unit	11	11
Engineering Cost Unit		
General	4	4
Design Cost	8	8
Project Cost	20	19
Technical Cost	13	12
Employee and Public Relations Cost Unit		
General	2	2
Plant Activities Cost	10	10
Community Cost	5	4
Medical Cost	3	3
Manufacturing Cost		
General	2	2
Financial Representatives	13	13
Budgets and Control	18	18
Reports and Records	16	16
Analysis and Studies	3	3
	<u>128</u>	<u>125</u>
 <u>General Accounting Section</u>		
Accounts Payable Unit	25	24
Accounts Receivable Unit	21	20
General Books Unit	17	16
Administrative Planning	3	3
Contract Reimbursements	5	5
	<u>71</u>	<u>68</u>

	<u>Current Month</u>	<u>Prior Month</u>
<u>Personnel Accounting Section</u>		
Payroll Planning and Analysis Unit	7	7
Weekly Payroll Unit	17	17
Monthly Payroll Unit	13	13
Benefit Plans Accounting Unit	13	13
Payroll Reports Unit	8	8
Weekly Payroll Records Unit	7	7
	<u>65</u>	<u>65</u>
<u>Procedures and Computing Section</u>		
Computing Operations Unit	21	24
Numerical Analysis Unit	12	12
Procedural Analysis Unit	15	15
Scheduling Unit	22	22
Records Unit	8	8
	<u>78</u>	<u>81</u>
<u>Property Accounting Section</u>		
Appropriations Unit	5	5
Inventory Accounting Unit	12	12
Property Accountability Unit	30	30
Property Management Unit	4	4
Capitalization and Depreciation Unit	20	20
	<u>71</u>	<u>71</u>
<u>SS Accountability Section</u>		
Reactor Area - SS Accountability Unit	5	5
Separations Area - SS Accountability Unit	18	18
Metal Preparation Area - SS Accountability Unit	8	8
SS Accounting Unit	6	6
SS Measurements Unit	8	9
	<u>45</u>	<u>46</u>
<u>Rotational Trainees</u>		
	<u>12</u>	<u>13</u>
	<u>512</u>	<u>510</u>

OPERATIONS RESEARCH AND SYNTHESIS SECTION

July, 1956

The following is the month end summary of personnel:

	<u>As of 6-30-56</u>			<u>As of 7-31-56</u>			<u>Net Change</u>		
	<u>Ex</u>	<u>Non-Ex</u>	<u>Total</u>	<u>Ex</u>	<u>Non-Ex</u>	<u>Total</u>	<u>Ex</u>	<u>Non-Ex</u>	<u>Total</u>
General	1	1	2	1	1	2	0	0	0
Oper. Research Analysts	4	0	4	4	0	4	0	0	0
TOTAL	5	1	6	5	1	6	0	0	0
	*	*	*						

Conferences have been held with appropriate members of the organization study for the Irradiation Processing Department relative to the implementation of the concepts contained in the reactor data processing report. It is anticipated that an active program will be initiated under the new organization.

The relationship between the variable goal discharge curves developed in a recent report from the Pile Technology Section and the work previously done by the Operations Research & Synthesis Section is being studied. A joint program to obtain the data and empirical curves necessary to actually implement the practical use of these developments in reactor production scheduling has been discussed.

The first results from the machine processing of slug rupture data have been made available and preliminary analyses are underway.

Due to the interest in profitability as a measurement concept for the decentralized organization, there has been a renewed interest in matrix methods of cost accounting. These methods make possible a completely mechanized approach to the elimination of profit, and hence minimize the duality required in order to maintain the profit system and at the same time make available reports on actual cost.

Further discussions were held with respect to disaster causes and potentialities. In particular, discussions with Dr. James Conant of the Industrial Medical Section concerning the psychological aspects of this problem were most helpful.

At the request of the Purchasing and Stores Section, an analysis was made of a proposed three-year requirements contract for the purchase of aluminum nitrate nonahydrate (ANN). It was the intent of the new contract to be self-contained and at the same time duplicate the price structure of the former contracts. Since it was determined that the escalator coefficient in the appropriate pricing formula was a discontinuous function of the market price of ammonia, it was necessary to consider the estimated market distribution in order to establish an appropriate constant coefficient. The effect of four such distributions on this coefficient was presented in order that an appropriate choice could be made.

END

**DATE
FILMED**

12 / 17 / 92