[redacted]

DECLASSIFIED
WITH DELETIONS

HW--42219-Del.

DE93 009181

This docum
of 440 page
[redacted]

62188

RECEIVED
APR 23 1956
700 AREA
CLASSIFIED FILES

MONTHLY REPORT

HANFORD ATOMIC PRODUCTS OPERATION

FOR

MARCH 1956

Received OSTI
AUG 24 1992

DECLASSIFIED
WITH DELETIONS

Classification Cancelled (Change to
.....
By Authority of CG-PR-2
DS Lewis 5/28/92
Dox Krisher 7/23/92
PM Eck 1-23-92

Compiled by
DEPARTMENT MANAGERS

April 20, 1956

CLASS[redacted]
DEC[redacted]
UNCL[redacted]
By [redacted]
Date [redacted]
U. S. AE[redacted]

RICHLAND, WASHINGTON

Operated for the Atomic Energy Commission by
General Electric Company under Contract #W-31-109-Eng-52

[redacted]

Route To:	P. R. No.	Location	Files Route Date	Signature and Date
AEC-HQ				
E. Evans				

DISTRIBUTION RESTRICTED TO U.S. ONLY

DECLASSIFIED MASTER [redacted]
WITH DELETIONS

DISTRIBUTION

Copy Number	
1	K. R. Van Tassel
2	W. E. Johnson
3	W. K. MacCready
4	A. B. Greninger
5	D. M. Johnson
6	W. M. Harty
7 - 8	Atomic Energy Commission, Hanford Operations Office, Attn: J. E. Travis, Manager
9 - 10	E. J. Bloch, Director, Division of Production, Washington 25, D. C.
11 - 12	300 File

DECLASSIFIED

[redacted]

[redacted] DECLASSIFIED

TABLE OF CONTENTS

General Summary . . . . . A-1 and A-2
Staff B-1
Personnel Distribution C-1
Number of Employees D-1

Manufacturing Department . . . . . E-1 through E-4
- Metal Preparation Section . . . . . Eb-1 through Eb-10
- Reactor Section . . . . . Ec-1 through Ec-15
- Separations Section . . . . . Ed-1 through Ed-16
- Electrical Utilities Section . . . . . Ee-1 through Ee-5
- Purchasing and Stores Section . . . . . Ef-1 through Ef-4
- Transportation Section . . . . . Eg-1 through Eg-6

Engineering Department . . . . . F-1 through F-4
- Engineering Administration . . . . . Fa-1 through Fa-2
- Pile Technology . . . . . Fb-1 through Fb-65
- Separations Technology . . . . . Fc-4 through Fc-69
- Design . . . . . Fd-2 through Fd-15
- Project . . . . . Fe-2 through Fe-37
- Advance Engineering Ff-1

Employee and Public Relations Department . . . . . G-1 through G-4
- Personnel Practices . . . . . Ga-1 through Ga-13
- Employee Communications and Public Relations . Gb-1 through Gb-8
- Union Relations . . . . . Gc-1 through Gc-3
- Salary and Wage Administration Gd-1
- Education and Training . . . . . Ge-1 through Ge-4
- Health and Safety . . . . . Gf-1 through Gf-13

  Community Section Gg-1
  - Maintenance Renovation Unit . . . . . Gga-1 through Gga-5
  - Police Unit . . . . . Ggb-1 through Ggb-8
  - Commercial and Residential Property Unit . Ggc-1 through Ggc-7
  - Fire Unit . . . . . Ggd-1 through Ggd-3

  Community Operations Sub-Section
  - Electrical Unit . . . . . Ggf-1 through Ggf-4
  - Engineering Unit . . . . . Ggg-1 through Ggg-2
  - Public Works and Recreation Unit . . . . . Ggh-1 through Ggh-4
  - Water and Sewerage Utilities Unit . . . . . Ggi-1 through Ggi-2
  - Richland Public Library . . . . . Ggj-1 through Ggj-2

  Auxiliary Operations and Plant Protection Section Gh-1 through Gh-32

Radiological Sciences Department . . . . . H-1 through H-8

Financial Department . . . . . I-1 through I-40

Operations Research and Synthesis Section J-1

[redacted]

MONTHLY REPORT
HANFORD ATOMIC PRODUCTS OPERATION

MARCH 1956

GENERAL SUMMARY

PRODUCTION OPERATION

The net production of acceptable finished slugs was 422 tons which was 105 percent of the forecast. By March 12, the canning yield and operation efficiency had improved sufficiently to permit a reduction from seven to six canning lines.

The plutonium input production, establishing a new monthly record, was 5 percent over the forecast. The production increase was due principally to the improved time operated efficiency of 71.7 percent, which was 4 percent higher than the previous month. Major factors contributing to this efficiency were the significant decrease in the number of slug failures and a reduction in the outage time required for the tube replacement program.

A total of 19 slug ruptures, including 17 regular metal pieces and 2 production test slugs, occurred during the month. The outage time required for the month for these ruptures was 252 hours.

Tube replacement programs continued during the month at B, D, F and H. A total of 278 tubes were removed and replaced at these reactors with a total of 493.5 hours of outage time required for the work.

The Purex facility resumed operation on March 19 after a 27-day outage. The major effort of decontamination and painting to effect clean-up in the pipe and sample gallery after the February 22 incident was essentially completed at month end. Following startup, at a 12 ton per day rate, operation was continuous throughout the remainder of the month. The final uranium product met all specifications with the exception of gamma ratios, but successive daily operation indicated progressive improvement. At the end of the month the product remained out of specification as required for calcination; however, filtration through silica gel was effectively reducing the gamma ratio. Initially, the plutonium product decontamination was out of specification but before month end in-specification product was being obtained and sent to Metal Fabrication. Waste losses, particularly following startup, were excessive, but during the final week of the month were acceptable for both products.

ENGINEERING TECHNOLOGY

Four charges of I & E slugs and four charges of standard slugs were charged into the C Pile to evaluate the heat transfer characteristics and conversion ratios attainable with these internally and externally cooled fuel pieces.

Measurements of the nuclear lattice parameters and cold clean conversion ratios in I & E slugs typical of the design used in the C Pile tests, indicate that the conversion efficiency is essentially the same as for solid fuel elements.

DECLASSIFIED

A new Redox flowsheet for processing high MWD/T was issued. The new flowsheet incorporates revisions designed to eliminate potential critical mass problems in two phase systems in the plutonium cycle feed tanks. Two-stage backcycle of wastes was instituted during the period and decontamination and losses were excellent.

Laboratory studies using Versene in Purex process streams have indicated that substantial improvement in decontamination factor may be possible. The agent was also found to be effective in removing zirconium-niobium activity from used solvent.

Work was started on a project proposal for the design and installation of a semi-works facility in the Fuel Element Pilot Plant to produce lead-dip processed internally and externally cooled fuel elements.

A strike by teamsters, operating engineers, and cement finishers was begun on March 22, 1956, and the general issue was the discarding of the Hanford Works Agreement. All Minor Construction work was essentially stopped, and progress by other construction forces was reduced drastically. As a result of the reduced workload, 76 Project Section employees were given notices of a temporary layoff to be effective March 30, 1956; however, 44 were placed in temporary assignments, seven went on vacation, and four married women declined assignments in deference to men who were heads of families.

A general conclusion, arising from the preparation of the Supplementary Construction Budget Document and the Research and Development Program Proposal for FY 1957 and 1958, is that the construction of new reactors is economically attractive as compared to the modification of existing reactors when the object is increased production capacity.

GENERAL

Notification was received that Supplemental Agreement No. 33 to the prime contract with the Atomic Energy Commission was executed on March 9.

The balance in unclassified property subaccounts was reduced from $10,704,000 to $560,000 during March. This reduction resulted from the complete unitization of twelve construction projects and the transfer of these costs to classified property accounts.

The report, 1955 at Hanford, was completed during the month and distributed through Classified Files.

There were no disabling injuries during the month. There were 375 medical treatment cases. The community had 25 medical treatment cases.

The rapid motion of contaminated ground water toward the Columbia River was closely watched.

Quite significant concentrations of Co^{60} in the ground water were reported; this is a previously unidentified contribution.

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

MARCH 31, 1956

	100-B Area	100-D Area	100-F Area	100-H Area	100-K Area	200-E Area	200-W Area	300 Area	700-1100 Area and Plant General	Other Areas*	Total
ENGINEERING DEPARTMENT											
Exempt	30	47	1	4	26	48	62	257	311	5	791
Other	19	30	2	12	23	15	36	231	192	80	640
Total	49	77	3	16	49	63	98	488	503	85	1 431
MANUFACTURING DEPARTMENT											
Exempt	74	57	77	101	62	99	222	114	125	-	931
Other	300	334	248	409	259	520	1 043	572	676	-	4 361
Total	374	391	325	510	321	619	1 265	686	801	-	5 292
FINANCIAL DEPARTMENT											
Exempt	-	-	-	2	-	-	5	6	120	1	134
Other	-	-	-	6	-	-	22	13	333	-	374
Total	-	-	-	8	-	-	27	19	453	1	508
EMPLOYEE AND PUBLIC RELATIONS DEPARTMENT											
Exempt	22	6	6	6	9	7	14	12	211	-	293
Other	66	45	41	46	51	43	121	107	848	53	1 421
Total	88	51	47	52	60	50	135	119	1 059	53	1 714
RADIOLOGICAL SCIENCES DEPARTMENT											
Exempt	1	1	30	1	-	2	21	74	6	-	136
Other	-	8	46	-	3	18	26	179	20	-	300
Total	1	9	76	1	3	20	47	253	26	-	436
GENERAL											
Exempt	-	-	-	-	-	-	-	-	8	-	8
Other	-	-	-	-	-	-	-	-	3	-	3
Total	-	-	-	-	-	-	-	-	11	-	11
Total Exempt	127	111	114	114	97	156	324	463	781	6	2 293
Total Other	385	417	337	473	336	596	1 248	1 102	2 072	133	7 099
GRAND TOTAL	512	528	451	587	433	752	1 572	1 565	2 853	139	9 392

* Includes White Bluffs and B-Y Exchange.

HANFORD ATOMIC PRODUCTS OPERATION
NUMBER OF EMPLOYEES
MARCH 31, 1956

DEPARTMENT	EXEMPT 3-31-56	EXEMPT 2-29-56	OTHER 3-31-56	OTHER 2-29-56	TOTAL 3-31-56	TOTAL 2-29-56
GENERAL MANAGER'S GROUP	8	8	3	3	11	11
EMPLOYEE AND PUBLIC RELATIONS DEPARTMENT						
General	9	9	7	7	16	16
Salary and Wage Administration	11	11	10	10	21	21
Personnel Practices	19	19	40	42	59	61
Education and Training	6	6	56	65	62	71
Emp. Comm. and Pub. Rel.	11	11	41	40	52	51
Union Relations	5	5	1	1	6	6
Aux. Oper. and Plant Protection	116	115	787	786	903	901
Community	69	75	307	304	376	379
Health and Safety	47	48	172	167	219	215
ENGINEERING DEPARTMENT						
Engineering Administration	29	27	84	85	113	112
Advance Engineering	7	7	1	1	8	8
Design	176	178	108	109	284	287
Project	186	181	165	163	351	344
Pile Technology	231	229	184	188	415	417
Separations Technology	162	163	98	98	260	261
MANUFACTURING DEPARTMENT						
General	24	24	8	8	32	32
Reactor	373	362	1 541	1 537	1 914	1 899
Separations	299	301	1 483	1 507	1 782	1 808
Metal Preparation	113	112	572	582	685	694
Transportation	44	44	444	447	488	491
Purchasing and Stores	63	63	238	232	301	295
Electrical Utility	15	15	75	74	90	89
FINANCIAL DEPARTMENT						
General	9	9	5	5	14	14
Budgets and Measurements	7	7	8	8	15	15
Contract Cost	25	24	106	104	131	128
General Accounting	9	10	60	59	69	69
Property Accounting	18	18	50	51	68	69
Auditing	14	14	2	2	16	16
SS Accountability	10	10	38	38	48	48
Personnel Accounting	9	9	57	56	66	65
Procedures and Computing	33	33	48	48	81	81
RADIOLOGICAL SCIENCES DEPARTMENT						
General	5	5	-	-	5	5
Records and Standards	34	33	182	172	216	205
Biophysics	56	56	70	70	126	126
Biology	29	28	43	42	72	70
Engineering	9	9	1	1	10	10
Adm. and Comm.	3	3	4	4	7	7
GRAND TOTAL	2 293	2 281	7 099	7 116	9 392	9 397

MANUFACTURING DEPARTMENT

MARCH, 1956

METAL PREPARATION SECTION

The net production of acceptable finished slugs was 422 tons which was 105 percent of the forecast. By March 12, the canning yield and operation efficiency had improved sufficiently to permit a reduction from seven to six canning lines.

A composite yield of 77 percent was experienced and represents an improvement of one percent over the previous month. This yield reflects a decrease of rejects in canning and miscellaneous categories. The bond test reject rate increased slightly, however, due to more critical testing methods, resulting primarily from use of additional bond testers. The testing of canned slugs by the frost test procedure was discontinued early in the month.

The total inventory of acceptable canned slugs decreased in March to a five weeks supply. The inventory of bare slugs, excluding those in process, fluctuated from a ten to a three day supply.

Three major special canning operations were continued throughout the month, namely, canning of C slugs by the hot press process, canning of I and E slugs on a production test basis, and canning of dingot uranium, also on a production test basis.

There were no slug failures at autoclave this month.

REACTOR SECTION

The plutonium input production, establishing a new monthly record, was 5 percent over the forecast. The production increase was due principally to the improved time operated efficiency of 71.7 percent, which was 4 percent higher than the previous month. Major factors contributing to this efficiency were the significant decrease in the number of slug failures and a reduction in the outage time required for the tube replacement program.

The reactor output production was 6 percent over the forecast and was the direct result of the increased input production. A total of 244 and 215 tons of low and high concentration metal was discharged respectively.

Previously established maximum operating levels, excluding enrichment burnout, were increased by a total of 178 MW, with 39 MW at KW and 139 MW at KE. In both cases the increases were attributed to improved flattening and improved operating techniques.

A total of 19 slug ruptures, including 17 regular metal pieces and 2 production test slugs, occurred during the month. The outage time required for the month for these ruptures was 252 hours.

DECLASSIFIED

DECLASSIFIED

Twenty-three reactor scrams occurred during the month, twelve of which were due to normal Panellit variables.

Outages for leak testing of process tubes were necessary at D, F and H, with two leaking tubes being found at D, seven at F plus nine Van Stone flange leaks, and one at H. A total of 145.9 hours of outage time were required for finding and subsequent correction of these leaks.

Tube replacement programs continued during the month at B, D, F and H. A total of 278 tubes were removed and replaced at these reactors with a total of 493.5 hours of outage time required for the work.

SEPARATIONS SECTION

The production of low ngs plutonium from the primary plants was 74 percent of the forecast. However, the total production for the third quarter FY 1956 exceeded the quarterly total forecast by 18 percent. Plutonium output during March was scheduled to accommodate such planning considerations as the shutdown of the bismuth phosphate facility, the resumption of operation of the Purex Plant, the conversion of the Redox Plant from low to high concentration feed, the limited inventory of adequately cooled low concentration material and the overproduction of product during January and February.

The Redox Plant resumed operations on March 1 following completion of a shutdown for maintenance work. The operating rate was essentially maintained at 10 tons per day until March 29 when the plant was shut down to effect a cleanout for subsequent processing of high concentration material. During the month process interruptions, all due to equipment difficulties in D cell, totaled 123 hours of outage time. A full scale back cycle flowsheet was experimentally tried and evaluation of this type of processing was in progress at month end. During the month approximately 71 tons of Purex UNH was reworked through the plant.

The final processing of plutonium runs at the T Plant was completed on March 20. Acid washes of the processing equipment were in progress at month end. The processing of material for the extraction of neptunium was also completed and on March 19 this product was sent offsite.

The Purex facility resumed operation on March 19 after a 27 day outage. The major effort of decontamination and painting to effect clean-up in the pipe and sample gallery after the February 22 incident was essentially completed at month end. Following startup, at a 12 ton per day rate, operation was continuous throughout the remainder of the month. The final uranium product met all specifications with the exception of gamma ratios, but successive daily operation indicated progressive improvement. At the end of the month the product remained out of specification as required for calcination; however, filtration through silica gel was effectively reducing the gamma ratio. Initially, the plutonium product decontamination was out of specification but before month end in-specification product was being obtained and sent to Metal Fabrication. Waste losses, particularly following startup, were excessive, but during the final week of the month were acceptable for both products.

The TBP Plant production was 118 percent of the forecast with feed material from the farms being delivered in quantities sufficient to maintain an average 5.5 ton per day processing rate. In addition to the regular feed, about 50 tons of Purex UNH were reworked through the second cycle. Mechanical difficulties with a first cycle column control valve air jumper caused 145 hours of outage time.

Waste metal removal rate was adequate to maintain a suitable TBP Plant feed inventory.

The UO_3 facility production exceeded the forecast by 15 percent with new monthly records being established for total output and total tonnage of powder shipped offsite.

Metal fabrication activities were confined to producing the larger assemblies, using low g/t plutonium as feed.

GENERAL

Personnel

On Roll March 1, 1956	5308
Net Decrease	16
Total on Roll March 31, 1956	5292

W.K. MAC CREADY, MANAGER
MANUFACTURING DEPARTMENT

DECLASSIFIED

HW-42219 [DEL]

DECLASSIFIED

MANUFACTURING DEPARTMENT

PATENT REPORT SUMMARY
FOR
MONTH OF MARCH, 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	TITLE
T.B. Correy	Method and Equipment for Inner Weld on Internally and Externally Cooled Fuel Elements
H.V. Herndon	PC Aluminum Tubes

W.K. MAC CREADY, MANAGER
MANUFACTURING DEPARTMENT

[redacted]

April 6, 1956

MANUFACTURING DEPARTMENT
METAL PREPARATION SECTION
March, 1956

RESPONSIBILITY

There was no change in responsibility during this period.

II. ACHIEVEMENT

A. Operating Experience

1. Statistics

	March	February	Year to Date
Total Acceptable Slugs Canned (Tons)	422	387	1,129
Composite Canning Yield (%)	77	76	76
Efficiency (%)(Canning Throughput)	92	88	87
Forecast Achievement (Current Committment)	105	103	103
Net Acceptable Solid Slugs (Tons)	412	378	1,095
Slugs Returned from Reactor (Tons)	2.94	2.24	6.77
Canning Yield (%)	78	78	78
Net Acceptable Cored Slugs (Tons)	10	9	34
Slugs Returned from Reactor (Tons)	0.15	0.56	1.40
Canning Yield (%)	67	37	44
Autoclave Failure - Solid (No./M)	0.00	0.00	0.00
Autoclave Failure - Cored (No./M)	0.00	0.00	0.00
Acceptable C-4 Slugs Canned (Pieces)	0	0	0
Acceptable Pb-Cd Slugs Canned (Pieces)	658	7,330	12,617
Average Steam Generated (M lbs/hr)	55.7	76.7	
Maximum Steam Generated (M lbs/hr)	83.0	110.0	
Total Steam Generated (M lbs)	41,576	54,860	
Coal Consumed (Tons)	2,612	3,562	
Sanitary Water from 3000 Area ($\bar{M}$ Gals)	67.1	65.3	
Average Rate (GPM)	1,503	1,564	

DECLASSIFIED

2. Activities

A net production of 422 tons of acceptable finished slugs, achieved in 22 working days, was essentially 105 percent of forecast. Of the 422-ton total, ten tons were cored slugs and one ton was four-inch solid slugs. The canning yield and efficiency improved sufficiently during the month to permit reducing canning activity from seven to six line shifts per day on March 12.

A composite yield of 77 percent was experienced in March which was an improvement of one percent over the previous month. The major causes for rejection were inclusions, bad welds, and poor bonds. The March yield rejects decreases in canning and miscellaneous reject rates and a significant increase in bond test rejects. The increase in bond test rejects was due to the mid-month total conversion to more critical testing by the bond testers.

The canned slug inventory in the 100 and 300 Area storage totaled approximately a five-week supply. The bare slug inventory increased slightly during March. The inventory, excluding slugs in process, fluctuated during the month from a ten to a three-day supply.

Two carloads of materials were shipped to National Lead Company of Ohio during the month. The first shipment consisted of approximately 0.7 tons of uranium contained in tin dross and sand removed from the burning grounds. The second shipment consisted of approximately 21 tons of solid scrap. The second shipment was derailed east of St. Maries, Idaho, and Operations Subsection personnel assisted the A.E.C. in recovering and reboxing the solid scrap.

A total of 7,797 canned slugs used for 100-KW startup purposes were processed safely through slug recovery.

No autoclave failures occurred during the month.

3. Special Operations

There were 550 uranium enriched aluminum alloy C slugs canned using the hot press process. There were approximately 2700 hot press canned slugs ready for bond testing.

During the month a small test lot of 168 I and E slugs were canned on a production test basis. The slugs were successfully canned two at a time, using the forty-five second cycle.

Approximately 29 tons of dingot slugs were outgassed and eight tons of slugs were heat treated during the month.

There were 658 Pb-Cd poison slugs canned with a yield of 96 percent. This year to date 12,617 poison slugs have been canned with a high yield of 98 percent.

4. Schedule Variance

Acceptable canned slug production was 105 percent of forecast, based on the March commitment of 401 tons.

B. Equipment Experience

1. Operating Continuity

The canning line "time-operated" efficiency was 92 percent which was an increase of four percent from last month and eleven percent from January. The continued improvement in the canning efficiency is due to the improved continuity of the finishing line operation and a sufficient bare slug supply.

2. Inspection, Maintenance, and Replacement

The metal basket hanger shoes in the number two cap and can machine guide rail system were replaced with wooden shoes in an effort to avoid dislodging brass particles which cause copper contamination in the cleaning solutions.

Routine maintenance of the canning line continued during the month with work completed on the number three canning line which is now operating with little equipment difficulty. Work on the number four canning line has neared completion.

The installation of new electronic bond testers on both finishing lines was completed. The use of the frost test machine was discontinued.

Slug recovery operations were disrupted for 81 hours due to the unsafe condition of the slug hoist gear brake.

A thorough study has started on the component parts conveyor in order to improve its performance. It appears that correction of defects will continue for several weeks.

C. Improvement Experience

1. Production Tests

P.T. 313-47-MT "Cored Slugs from Extruded Blanks and Rolled Rods" (HW-33189) The preparation of eight-inch drilled cored slugs with aluminum end plugs for irradiation to high goal exposure continued. A total of ten tons of finished slugs was produced with a 67 percent yield. The yield has continued to improve appreciably since the reheat-treating of slugs was discontinued.

There is some indication that cored slugs with larger internal hole diameters may be more resistant to rupture, and in addition slug length may influence irradiation performance. Limited in-pile tests are being planned to further investigate the effect of both the I.D. and length of cored slugs.

P.T. 313-56-MT "Canning of Four Tons of Dingot Uranium for Pile Evaluation" (HW-37695) The processing of eight-inch dingot uranium slugs for irradiation to low goal exposure was continued as authorized by Supplement A to this production test. Forty-eight tons of finished slugs were produced with a yield of 80 percent. Approximately 135 tons of dingot slugs have been prepared for pile charging since this program was started.

DEC[redacted]SSIFIED

Production Tests - continued

Because of the high hydrogen content (approximately 5 ppm vs. less than 2 ppm in ingot slugs) of dingot uranium slugs, Mallinckrodt has been requested to discontinue producing dingots in production quantities for HAPO slugs until the metal reduction and fabrication processes are more fully developed. Although dingot slugs are being outgassed in a salt bath before canning, bond porosity continues to be excessive. Consequently as soon as the pipeline of production material is exhausted, the evaluation of dingot uranium will be limited to a level necessary to support off-site process development.

P.T. 105-615-A-63-MT "Evaluation of I and E Slugs Canned by the Lead Dip Process" (HW-39886A) Because of apparent improvements in the quality of lead-dip I and E slugs prepared using standard thick base aluminum cans and spire well-type caps, only four tubes of the slugs previously prepared with three aluminum components were charged in C pile on March 14. These slugs are scheduled for exposures of 150, 300 and 500 MWD/T. The remaining four tubes of slugs authorized to be exposed to rupture will be prepared with standard components early in April.

Two experimental runs were made during this period to evaluate the canning of I and E slugs with standard aluminum components, using a revised 45 second cycle and assembly techniques developed by Fuel Technology. The results were favorable with the exception of cap seating. The caps tend to float after seating unless they are held down by either a mechanical device or crimping. Further development is in progress to alleviate this problem.

P.T. 105-620-A-65-MT "Irradiation of Slugs Having Truline End Contours" (HW-40526A) A test designed to evaluate regular lead-dip slugs with truline end contours, as a means of preventing slug misalignment in reactor process tubes, has been delayed pending the delivery of truline cans. Partial delivery of the 100,000 cans on order is expected about mid-April.

P.T. 105-621-A-65-MT "Evaluation of Slugs Having Sealed Anodized Coatings" (HW-40587A) The anodizing of solid lead-dip slugs was completed to further evaluate the resistance of anodized slugs to abrasion during pile charging and general corrosion during irradiation. Thirteen tubes will be charged alternately with anodized and regular production slugs to compare performance.

P.T. 105-622-A-68-MT "In Pile Evaluation of General Corrosion Characteristics of Ni-Al Alloy M-388 Slug Jackets" (HW-41178A)

This test is designed to make an initial comparison of the resistance of M-388 (one percent Ni) alloy and standard M-329 alloy slug jackets to intergranular corrosion during irradiation. A total of 100 solid slugs were canned with Ni-Al alloy jackets during this period, and 64 of the finished slugs have been measured for pile charging.

[redacted]

2. Process Tests and Revisions

An air jet dryer system for the sleeve trays has been installed to thoroughly dry the sleeve tray cups before clean dry sleeves are placed in them prior to transportation to the canning lines.

The Mallinckrodt Chemical Works has shown that a recent slight decrease in reactivity of uranium produced by them was caused by slightly lower than normal U-235 concentration in scrap received from Fernald.

Evaluation of a test lot of uranium slugs manufactured from Canadian-produced orange oxide showed that metal to be finer grained than usual and consequently the transformation test rejection was high (21 percent). Otherwise, these slugs were comparable to regular production.

Laboratory and functional evaluations of 4000 Hunter-Douglas cans are essentially complete and show these units to be of high quality.

Test results to date, on the 1600 sleeves from the Rottler Boring Bar Company show that over 1100 sleeves are still serviceable. The sleeves do not shrink from thermal cycling and sleeve warp appears to be a reversible phenomenon. No significant difficulties with slug quality have been encountered. As the sleeves have been processed through approximately 156 cycles versus a normal life of about 60 cycles, a slight effect has been noted on canned slug dimensions. The average warp and eccentricity is increasing slightly and from one to six final inspection tube rejects are experienced daily. These values are still less than those produced with honed sleeves (less than 0.1 percent of total inspected) and results indicate that honing of sleeves is unnecessary.

The Quality Control Reporting System is now in use and appears to be reliable both mechanically and electrically.

Effects of vibration on the sleeve assembly in the canning operation are under investigation. Results to date show that assemblies vibrated at 11,600 cycles per minute produce canned slugs with lower than average bond test counts, fewer voids near the base of the slug, more continuous AlSi bonding layers, and a normal residual can wall thickness.

I and E slugs have been radiographed in a horizontal position to produce simultaneous exposure of both welds. Definition and contrast sensitivity have been satisfactory.

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 except the following:

T. B. Correy	Method and Equipment for Radiographing the Inner Weld on the Internally and Externally Cooled Fuel Elements
H. V. Herndon	PC Aluminum Tubes

[redacted]
DECLASSIFIED

DECLASSIFIED

D. Events Influencing Costs

1. Labor Variance

No Change is anticipated in the unit cost of direct labor.

2. Material Variance

A decrease of $.005 is anticipated in the unit cost of direct material.

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

A decrease of $.03 is anticipated in the unit cost of I.M.E. against February actual.

The decrease in material and I.M.E. are due to better yield and higher production.

E. Plant Development and Expansion

1. Project Status

Project CA-590 - Fly Ash Collection Equipment - 384 Building
The low bid for detail design and construction was $34,500 and although this bid is higher than the fair price estimate, the Commission has decided to award the contract to the low bidder. A revised proposal and directive increasing the authorized funds from $40,000 to $44,000 has been issued. The directive completion date was extended from June 30 to October 30, thus the work will still be completed when the steam demand is low.

Project CA-601 - General Grounds Improvements - 300 Area
Design has been initiated by the Architect-Engineer, Nickum & Sons of Seattle. A design schedule was made but was returned for corrections. The bid assembly is planned to be prepared by April 15. The contract for construction is planned to be let by July 1.

Project CG-614 - Hanford 4X Program
The contract for the changehouse modifications was let March 20, to the Grant Construction Company. Minor Construction is relocating the existing kitchen facilities for the interim period when the new facilities are being installed.

Plant Forces will complete all phases of the equipment installation by April 1 as planned. All furnace area work has been completed. Two welding units have been accepted and fabrication of parts to reduce eccentricity of the remaining units will be completed April 1.

Operational testing of autoclave units will be completed by April 6.

Project CG-640 - Noise Reduction - 300 Area
Minor Construction forces have ordered the acoustical materials for the 313 Building offices and construction work was started on March 21. A strike has delayed continuance of this work. Construction is expected to be complete June 1 on this phase of the program.

Project Status - continued

Design drawings have been completed and a work order issued to Maintenance to install the Hoffman Vacuum System and related piping within the 384 Building. This work is scheduled to be complete July 15, 1956.

Air compressor piping revision drawings are complete and a work order has been issued for installation. This work is scheduled for completion August 1, 1956.

The canning area remains as the only item requiring design on the project. It is planned to take corrective action in progressive stages. "Noise Stop" two by four baffles have been ordered and as soon as received on plant site the area over the salt bath furnaces will be treated in order to check the efficiency of design and incorporate these ideas for the "overall" canning area.

Project CG-646 - Modifications to Pickle Machines - 313 Building
A project approval was received from AEC Washington on February 14. The local AEC directive was issued on February 24. The contract has been awarded.

The beneficial use dates for the two machines are estimated to be September 24 and November 23, 1956. Operations Sub-Section estimates that production requirements can be met with this schedule.

IR-194 - Centralized Quality Reporting System
All installation and testing of this system was completed on March 1. The physical completion notice was issued on March 14. The system is currently in use.

An underrun of $5,400 was experienced on the project, primarily through (1) the acquisition of less expensive materials and components than planned (2) the combination of certain reject categories and (3) the elimination of the need for certain installations by process improvements made after scoping.

IR-202 - Lighting Improvements to 1171 Building (Stores)

The Commission approved the informal request and issued the Project Authorization on February 22. The Project Section Work Authority was issued March 1. The minimum design criteria was transmitted to the Commission on March 7. The design was completed and approved on March 15. The bid package is currently being assembled and invitations are expected to be issued by April 15.

F. Significant Reports Issued

1. Routine

Number	Title	Author	Date
HW-40819RD	Six Months Production Forecast and Operating Assumptions	HE Berg	3-7-56
HW-41288RD	MPS Monthly Production Report for February 1956	HE Berg	3-6-56

DECLASSIFIED

Routine - continued

Number	Title	Author	Date
HW-41783	Monthly Report, Process Subsection, Metal Preparation Section, February, 1956	KV Stave	3-5-56
HW-41784	Monthly Report, New Fuel Element Production Program, February 1956	WA Blanton	3-5-56
HW-41816RD	Monthly Report, February 1956 Operations Subsection, Metal Preparation Section	WW Windsheimer	3-2-56
HW-41835RD	Production Report - Metal Preparation Section, Operations Subsection, February 1956	HE Berg	3-7-56
HW-41856	Uranium Quality Control Analyses Results	GB Hansen	3-8-56
None	Status of Projects and Informal Approval Requests	DA Snyder	2-29-56
None	Monthly Report - Contact Engineering Unit	JW Nageley	2-29-56
None	Projects and Personnel Subsection Monthly Report	DW Haught	3-5-56

2. Non-Routine

HW-41798RD	Forecast Study - Metal Preparation Section, February 1956 - June 1958	HE Berg	3-6-56
HW-42097	Report of Invention - Method and Equipment for Inner Weld on Internally and Externally Cooled Fuel Elements	TB Correy	3-20-56
HW-42290	Interim Report on the Use of Vibration to Eliminate Voids Found in the AlSi Bonding Layer of Fuel Elements	CA Strand	3-30-56
None	Report of Invention - PC Aluminum Tubes	HV Herndon	3-27-56

III. PERSONNEL

A. Organization

R. L. Brown, transferred from Mechanical Maintenance Unit to Production Maintenance Unit, Power & Maintenance Subsection.

C. T. Hayner was assigned as a Manufacturing Engineer in the Manufacturing Engineering Unit, Process Subsection.

V. L. Herzog, Process Engineer in Process Control Unit, Process Subsection, terminated March 23, 1956.

G. W. Johnson, Technical Graduate, promoted to Junior Chemist in the Laboratory Analysis Unit, Process Subsection.

H. S. Krider's position title was changed from Budget and Cost Analyst to Measurements Analyst.

L. A. Parker, transferred from Production Maintenance Unit to Mechanical Maintenance Unit, Power & Maintenance Subsection.

B. Force Summary

	Start of Month		End of Month		Net Change	
	Exempt	Non-Exempt	Exempt	Non-Exempt	E.	N.E.
Section General	1	1	1	1	0	0
Operations	22	174	22	168	0	-6
Power & Maintenance	37	334	37	333	0	-1
Process	38	68	39	64	+1	-4
Projects & Personnel	15	5	15	5	0	0
Section Total	113	582	114	571	+1	-11
	(695)		(685)			

C. Safety Experience

During 120,016 exposure hours, members of the Metal Preparation Section experienced two serious accidents or other incidents, and 61 medical treatment injuries for a frequency rate of 5.08.

Mechanical devices were installed for improvements in material handling at the 3717 Building and the coal unloading station which will reduce exposure of personnel to hazards. In addition more adequate lighting was provided for grounds in the vicinity of 313 Building.

D. Radiation Experience

No exposures in excess of 200 mrads/week and 25 exposures in excess of 100 mrads/week were reported during the month.

DEC[redacted]FIED

DEC DECLASSIFIED

E. Personnel Activities

1. Visits and Visitors

G. B. Hansen attended a meeting of participants of General Analytical Control Program at Carbide and Carbon Chemical Company, and also visited the National Lead Company of Ohio to discuss gas analyses as applied to uranium quality control.

J. C. Finley, Sales Representative, from Aluminum Company of America met with T. D. Naylor to discuss quality of aluminum components.

G. W. Davis, Solvents Technical Representative from E. I. du Pont de Nemours and Company visited HAPO to discuss specifications for trichloroethylene.

John Gracie, Atomics International, Inc., Division of North American Aviation, visited with K. V. Stave, S. M. Gill, and R. H. Lincoln to discuss fuel element fabrication facilities.

J. S. Shipp and R. D. Gilbert attended the ASME Spring Meeting in Portland, Oregon. They also visited the operating facilities of the Hyster Corporation and Crown Zellerbach.

K. V. Stave visited Pacific Lutheran University and College of Puget Sound in Tacoma to recruit technical personnel.

2. Meetings

There were 21 round table meetings, 25 information meetings, 25 staff meetings, and 77 safety-security meetings held by members of the Section during this report period.

Richland, Washington
April 6, 1956

MANUFACTURING DEPARTMENT
REACTOR SECTION
MONTHLY REPORT
MARCH, 1956

I. RESPONSIBILITY

Assigned responsibilities of the Reactor Section remained unchanged during March.

II. ACHIEVEMENT

A. Operating Experience

Reactor time operated efficiency for March was 71.7 per cent, approximately four per cent higher than in February. Major factors contributing to this increase are (1) a significant decrease in the number of slug failures, and (2) a reduction in the outage time required for the tube replacement program.

Reactor input production for March was approximately four per cent above forecast. The increase is due to the improved time operating efficiency which resulted in a higher average operating level. March input production was a record high and exceeds the previous high of December, 1955, by 5.7 per cent.

DECLASSIFIED

DECLASSIFIED

A. Operating Experience (Continued)

Reactor output production for March was approximately six per cent above forecast as a result of the increased input.

Established maximum reactor operating levels, excluding enrichment burnout, were increased a total of 178 megawatts, 39 at KW and 139 at KE Reactors. The increases are attributed to improved flattening and improved operating techniques.

A total of 19 slug failures occurred in March. This total represents a significant decrease from the total of 36 in February and 39 in January. Reactors sustaining ruptures were as follows:

	B	C	D	DR	F	H	Total
Eight-Inch Regular		1	1	5	2	7	16
Eight-Inch Cored	1						1
Production Test		1*			1**		2
	1	2	1	5	3	7	19

* PT-105-593-A "Irradiation of Cored Slugs With Aluminum End Plugs"

** PT-105-570-A "Irradiation of Cored Uranium Slugs"

1. Statistics

Operating statistics are summarized in the table on Page 3.

2. Activities

The discharge of rupture-prone material at a modified goal exposure continued during March with a total of eight tons additional metal used. To date, 36 additional tons of metal have been used for rupture control.

Tube replacement programs were conducted at B, D, F, and H Reactors with a total of 278 tubes removed and replaced, 16 air channels re-tubed and four tubes removed but not replaced. A total of 493.5 hours of outage time was required for this work.

Reactor	Average Hours/Tube
D	1.36
B	1.59
F	1.70
D	1.75

DECLASSIFIED

1. Statistics

	B	C	D	DR	F	H	KE	KW	Total or Ave.
Reactor Time Operated Efficiency (%)	60.4	74.3	62.7	73.7	48.5	77.6	90.0	86.7	71.7
Reactor Outage Time (Hrs)									
Plutonium Production	294.7	145.7	277.7	156.2	377.0	166.3	74.5	98.9	1591.0
Special Irradiations and Tests	-	45.6	-	39.7	6.4	0.5	-	-	92.2
Total Outage Time	294.7	191.3	277.7	195.9	383.4	166.8	74.5	98.9	1683.2
Reactor Unscheduled Outage Time (Hrs)	55.3	105.8	38.9	195.9	204.6	79.7	43.6	52.2	776.0
Metal Discharged (Tons)	28.5	155.9	45.0	57.7	13.7	32.1	72.2	54.4	459
Water Quality (ppm Turbidity)									
Raw Water - Average	18	23	27	23	23	21	25	27	
Raw Water - Maximum	62	53	62	57	39	49	64	75	
Process Water - Average	0.005	0.004	0.005	0.005	0.003	0.001	0.003	0.003	
Process Water - Maximum	0.009	0.008	0.006	0.006	0.007	0.003	0.004	0.005	
Water Pumped (MM Gals)									
Bldg. 190 to reactor	1549	3067	1665	1853	1366	2116	5821	5705	23142
Bldg. 182 to 200 Areas			363						363
Bldg. 181		5414		4684	1703	2460	6268	5870	26399
Steam Generated (MM Lbs)		140		223	107	113	26	21	582
Coal Consumed (Tons)		8728		13551	7389	6619			36287
Oil Consumed (M Gals)							248	203	451

[redacted]

DEL

[redacted]

A. Operating Experience

2. Activities (Continued)

The H Reactor was shut down on March 9, for the evaluation of process tube replacement tools and procedures, and again on March 25, for the successful installation of five process tubes. Reactor outage time required for this work was 48.0 hours. A full-scale tube replacement program at this reactor is planned for April

Since the problem of inserting new tubes in the H Reactor graphite stack may require several months to reach a satisfactory solution, consideration was given to reduction of outlet temperatures to reduce corrosion rates. In lieu of this, it was decided to reduce the pH of the process water to 7.0. This pH reduction is expected to alleviate tube corrosion sufficiently to gain some time for solving tube replacement problems.

Later in the month, at the request of Process Sub-Section, process water pH was reduced at all reactors from 7.65 to a 6.9 - 7.2 bracket for a long-range program to reduce tube corrosion. Adjustment to the new range was accomplished by gradually increasing the alum dosage with a corresponding increase in activated silica to aid in coagulation and settling of the excess alum. A reduction of two hours in filter runs resulted from increased "carry-over." The temporary acid feeding facilities which were completed during the month are expected to alleviate this condition and reduce the requirement for additional chemicals.

In summary, the tube replacement program had its best month to date in March with a significant decrease in average time required per tube and a large decrease in overtime usage.

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

	Tubes Charged	Tubes Discharged	Casks Shipped
Production Tests	24	13	3
Mint Flattening	11	13	
"C" Metal	3	2	
Rala		4	
Totals	38	32	3

[redacted]

DECLASSIFIED

B. Equipment Experience

A total of 23 reactor scrams occurred in March, 12 of which were caused by normal Panellit system variables. Causes of the other scrams are noted below.

Reactor	Reason
C	Thirty minute manual shutdown for repair of a ruptured one-inch vent line on the south supply header in the 190-C Building.
D	High level inter-tie trip due to a blown fuse in the D Reactor safety circuit caused by electricians working on DR Reactor instrument wiring.
D	No. 2 Beckman trip resulting from flux unbalance during start-up.
D	Manual scram to control exit tube temperatures.
KE	Panellit trip on ball valve tube which had been backseated too far thus allowing charge to wash downstream and change tube pressure during operation.
H	No. 1 scram resulting from electrical surge caused by a short circuit in the KAPL-120 circuitry.
KE	Panellit trip caused when high pressure crosstie opened as a result of an error in switching in the electrical equipment room at the KW Reactor.
KW	No. 4 Beckman trip due to a voltage drop resulting from switching air supply fans with both fans running.
DR	No. 1 safety circuit trip due to a burned out holding coil on the 1XX relay.
C	Panellit trip due to failure of front pigtail connection on tube 3158-C.
KE	Manual shutdown to investigate the position of VSR No. 32 when both in an out indicating lights were found on. The rod was found to have been in the reactor for a shoft period of operation. (See Equipment Experience and Radiation Experience.)

[redacted]

B. Equipment Experience (Continued)

Process tube leak testing programs were necessary at D, F, and H Reactors due to abnormally high water collection rates. A total of 145.7 hours of outage time was required for finding and correcting 19 leaks.

There were 78 process tube outlet water temperature thermocouple failures. Twenty-five of these were at B Reactor, 18 at D, 14 at F, 12 at DR, eight at H and one at C Reactors.

The result of Panellit gage checks made in March disclosed the following faults:

Reactor	High Trips	Low Trips	Mercury Separation	Leaks	Misc.	Total
B		1			2	3
C						0
D				1	7	8
DR			1			1
F	3	4				7
H				1	9	10
KE	2	1	174			177
KW		5	124		16	145
	5	11	299	2	34	351

Range changes were made on approximately 4,000 gages during operation with two scrams resulting from such work.

Although repairs are continuing during scheduled outages, further difficulties with the vertical rod system have been experienced at the K Reactors. At KE Reactor, during a scram recovery, two rods had to be raised individually in order to make up the safety circuits and one rod had to be raised twice to latch. Also, during a scram, one hopper of Ball 3X system balls dropped due to a VSR limit switch malfunction. During start-up attempts, one vertical rod became stuck which required 7.9 hours of outage time for removal. At KW Reactor, recovery from two scrams was prevented due to the failure of two limit switches which resulted in dropping the associated hoppers of balls on both occasions.

The KE Reactor was operated for approximately 12 hours with VSR No. 32 inserted following recovery from a Panellit scram as a result of a limit switch failure which led to the erroneous conclusion that the VSR was up and the lower switch was stuck.

The No. 1 turbine-generator at 165-KE was returned to normal service after seven weeks of downtime necessary for repairs and testing following failure of the stator coils in January.

DECLASSIFIED

DECLASSIFIED

B. Equipment Experience (Continued)

While servicing slip rings and brushes on the No. 6 high lift motor at 190-KE Building, inspection of the liquid rheostat revealed that the tank cells (original equipment) were badly burned at the apertures. Replacement of the cells, and overhaul and testing of the rheostat were completed during March.

On March 3, high velocity winds dislodged nine concrete roof slabs at the southwest corner of the 190-F Building. One of the 4' x 6' slabs fell inside the building. No damage to personnel or equipment resulted other than the loss of the slab. The slabs have been replaced but additional repairs have not been made at month end.

On March 15, the No. 7 primary pump unit at 190-H Building was removed from service for replacement of the drive and pinion gears in the reduction gear assembly. During reassembly, it was noticed that the pump casing was cracked along the discharge nozzle. Attempts are being made to repair the casing by brazing and early replacement possibilities are being investigated in event the plant repairs prove inadequate.

C. Improvement Experience

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

PT-105-14-MR (Measurement of Heat Output of KE Reactor After Shutdown)
Results of this test indicate a somewhat lower heat output rate subsequent to a scram than previous data indicated. A report on this test will be issued by Process Sub-Section following the planned high pressure crosstie test.

PT-105-522-E (Examination of Pile Process Tubes)
Three process tubes were removed from the DR Reactor and two from C Reactor during March for corrosion study by the Technical Corrosion Study Group.

PT-105-548-E (C Pile Graphite Burnout Experiment)
The nine remaining tubes of J-Q material were discharged from C Reactor completing this production test.

PT-105-570-A (Irradiation of Cored Uranium Slugs)
A stuck rupture charged on this production test was removed from tube No. 2179-F on March 2, requiring 63.5 hours of outage time.

DEL

[redacted]

C. Improvement Experience (Continued)

PT-105-607-A-57-MT (Irradiation of Enriched Cored Slugs With Aluminum End Plugs and of Two Core Diameters)
Tube No. 2064-C, containing 24 regular metal and five four-inch cored Ike slugs, was discharged from C Reactor. The discharge of this tube completed irradiations scheduled under this test.

PT-105-615-A-63-MT (Evaluation of Internally and Externally Cooled Slugs Canned by the Lead Dip Process)
Eight tubes were charged at C Reactor in accordance with this production test on March 13. The eight run to rupture tubes authorized by this test will be charged at a later date.

PT-105-554-E (Evaluation of 7.0 pH Process Water)
This test was successfully continued through March at 100-F Area, maintaining 7.0 pH on the west half and 7.65 on the east half of the filter plant.

At D Reactor, the "B" test hole thimble and assembly were removed during the month and a sub-critical neutron monitor chamber was installed. This new detector has provided indications well in advance of the regular proportional counter.

New methods for evaluating field beta dose rates were adopted during the month by the Radiation Monitoring Sub-Section to obtain a more realistic measurement of beta dose rates. Dose rates established by the new system are lower by a factor of approximately two as compared with previous results by former methods.

Four revised Process Standards - Reactor were approved and issued. These Standards are titled "Slug Inspection and Storage," "Make-Up of Tube Charges," " Charge-Discharge During Shutdown," and "Charge-Discharge During Reactor Operation - Poison Column Control Facilities." The most significant changes accomplished by these revisions are as follows, respectively: (1) Relaxation of slug inspection requirements in view of past favorable experience during the low G/T program, (2) Alteration of the length of rear dummy charges to shift slug junctions thereby reducing slug junction pitting of process tubes, (3) Elimination of test requirements for charge machines during shutdown due to excessive wear of the machines, and (4) Modification of action required by Panellit gages at high trip to better accommodate normal conditions.

One revised Process Standard - Reactor Cooling Water was approved and issued. The Standard, "Film Formation Control," now requires super-quality process water supply during reactor outages to minimize film build-up.

[redacted] DECLASSIFIED

C. Improvement Experience (Continued)

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

D. Events Influencing Costs

Irradiation cost is expected to be about the same in March as in February. Major factors affecting total cost changes in March are the 31 day month, increased reactor gas consumption, and increased water treatment costs due to pumping of more water because of increased reactor demand and decline of raw water quality. Maintenance charges are expected to remain about the same as for February; however, overtime charges are expected to be about $50,000 less than in February which offsets the other cost increases.

As a result of these and less significant factors, unit cost for March is expected to drop to the all time low level reached last December since input production for March reached an all-time high.

E. Plant Development and Expansion

1. Project Status

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

CA-512 100-K Area

The project proposal for Revision No. 5 is being reviewed by the Manufacturing Department. Latest type Panellit switch bottles will be installed in KE Reactor during April for testing. Gamma monitoring design is approximately 92 per cent complete. Both fifth Beckman systems are now in operation at each Reactor. Estimates for inspection and repair of 107 tank bottoms have been orally transmitted to the Operations Sub-Section, and a summary letter is in preparation by the Projects and Personnel Development Sub-Section. Work is scheduled for elimination of effluent vapor in 105 Building tunnels, 107 tank foundation repairs, and installation of the "Fire-Eye" control systems at the 165 Buildings. Improvements of the 1704 and 1720 Buildings' heating and ventilating systems has been awarded to the Lewis-Hopkins Company.

E. Plant Development and Expansion

1. Project Status (Continued)

CG-558 Reactor Plant Modification for Increased Production

Total design is estimated to be 99 per cent complete. On March 22, a labor walkout began which eventually affected all Minor Construction crafts. This condition continued through month end. Acceptance test routine has progressed at a satisfactory rate with twelve procedures processed this month. All Panellit switches originally furnished for the project will be replaced. Study of the electrical distribution problems continues as does detailed planning of schedules for dovetailing non-project work during main CG-558 outages. For the immediate program, construction progress is close to schedule in spite of the present walkout. However, the Project Section is concerned that continuance of this contractor labor inactivity will extend the completion date for the entire project.

CG-666 Zone Temperature Monitoring, 100-B,C,D,DR, F, and H Areas

AEC Directive HW-377, dated February 29, 1956, authorizing $900,000 of funds be allotted from Project CG-558 funds and designating a completion date of January 1, 1958 for this project, was received this month. Financial issued Authorization No. 757, dated March 1, 1956. Also received was AEC Directive HW-309, Modification No. 11, dated February 29, 1956 which deleted the zone temperature monitoring and corresponding funds from Project CG-558. Financial issued Authorization No. 756, dated March 1, 1956.

2. Plant Engineering

A number of engineering and development studies were active in the Reactor Section during March. The studies are, in general, aimed at decreasing costs and/or increasing production. Details are given in document HW-42363. Several items of interest are reported below.

Testing of Separan in the experimental filter plant was continued successfully. Raw water of 100 ppm turbidity was treated without difficulty. A production test authorizing plant scale testing of Separan at 183-DR Building is being circulated for approval.

An experiment was conducted at the H Reactor to determine the forces required for broaching and new tube insertion. Indications were that past difficulties resulted from the mandrel used and not the broach. A new mandrel has been developed that

DECLASSIFIED

2. Plant Engineering (Continued)

will allow insertion of a new tube while the channel is being broached. The Mechanical Design Unit was asked to prepare drawings of charge and discharge elevator modifications to allow work to proceed at two elevations simultaneously. Installation of the second working platform should result in a 30 to 40 per cent reduction in the average downtime required per tube replaced.

A joint study has been initiated between Pile Technology and the Process Sub-Section to determine factors contributing to an adequate emergency water flow system for all reactors.

F. Significant Reports

1. Routine

Monthly operating reports issued for February were:

HW-41702-A	Reactor Section	R. S. Bell	3/7/56
HW-41761	Operations Sub-Section	A. R. Maguire	3/1/56
HW-41699	Process Sub-Section	O. C. Schroeder	3/1/56
HW-41746	Projects and Personnel Development	F.A.R. Stainken	3/1/56
HW-41730	Radiation Monitoring Sub-Section	P. C. Jerman	3/1/56
-	Reactor Areas Maintenance	R. T. Jessen	3/5/56
-	Project & Special Reactor Maintenance	E. E. Weyerts	3/6/56
HW-41763	Power Sub-Section	J. C. McLaughlin	3/5/56

Other routine reports issued during March included:

HW-42275	"Monthly Progress Report, Reactor Section Expansion, March, 1956"	J. P. Langan	3/30/56
-	"Status of Reactor Section Projects, Informal Requests, and Budget Items"	F.A.R. Stainken	3/20/56
HW-41778	"Reactivity Balance and Associated Data for February, 1956"	A. P. Vinther	3/1/56

2. Non-Routine

HW-41762	"Operating Budget Analysis - Feasibility of Installation of Zirconium Tubes"	G. F. Owsley and J. R. Young	3/8/56
HW-41503	"Status Report, K Area Water Program"	G. O. Amy	2/13/56
HW-41056	"Project Proposal - Water and Gas Leak Locating Equipment - All 100 Areas"	J. D. Floyd	3/8/56
HW-41754	"Interim Report No. 1 - Production Test 105-13-MR - Period August through December, 1955"	A. P. Vinther and S. R. Stamp	2/22/56
HW-42076	"Interim Report, Production Test 105-9-MR, Poison Column Displacement During Reactor Operation"	G. F. Owsley	3/21/56
HW-42090	"CG-666 - Zone Temperature Monitor Drawing Comments"	C. L. Owen	3/20/56

[redacted]

III. PERSONNEL

A. Organization

There were no appointments within the Reactor Section during March.

B. Force Summary

	Beginning Of Month	End Of Month	Net Change
Section General	2	2	0
Operations	409	410	+ 1
Project & Special Reactor Maint.	195	196	+ 1
Reactor Area Maint.	566	568	+ 2
Projects and Personnel	53	54	+ 1
Power	495	496	+ 1
Process	77	82	+ 5
Radiation Monitoring	106	107	+ 1
Section Total	1903	1915	+ 12

Changes during March included 43 transfers into the Section, 33 transfers out of the Section, three new hires, two terminations, five reactivations, and four deactivations.

C. Safety Experience

There were no disabling injuries during the month in the Reactor Section. There was a total of seven serious accidents or incidents during March as follows:

No. 56-12 - A "T" cart load of metal was dumped off the "C" elevator at C Reactor on March 3 when the "T" cart handle caught on the elevator while the cart was being raised. No injuries resulted. Investigation showed that the use of the particular cart involved was unathorized.

No. 56-14 - The "D" elevator was remotely lowered by Instrument men on the zero foot level while work was in progress on the elevator. No injuries resulted, probably as a result of the warning bell delay circuitry. Investigation revealed that the elevator operator failed to close the "cut-off" switch when work started.

No. 56-15 - A rotary shear fell to the floor in the 1717-F shop on March 7 when the bolts were removed from the base of the machine to move the work rest. The machine abraded a millwright's wrist as it fell. Investigation revealed faulty design and insufficient care as the underlying causes.

DECLASSIFIED

C. Safety Experience (Continued)

No. 56-16 - A geared, power-driven, conduit threading tool at F Reactor caught an electrician's glove as he attempted to turn off the machine. The electrician sustained lacerations on the left side of his forehead. Investigation fixed faulty design as the underlying cause.

No. 56-17 - A short to ground from the thermostat control box of the Ball 3X pump motor at B Reactor caused flash burns to the face of an electrician. Investigation revealed the electrician had failed to observe existing safety rules and that design of the electrical equipment was inadequate.

No. 56-18 - The rollers being used to move a radial drill in the 1717-F shop caught the left foot of a rigger who sustained a tuft fracture to his left great toe. The injured was not wearing safety shoes. Investigation charged the cause to lack of ordinary care on the part of the rigger.

No. 56-19 - A five-pound collar fell off the transfer area crane at 105-KW Reactor. No injuries resulted and the cause was attributed to improper maintenance by the investigating committee.

D. Radiation Experience

Four Radiation Incidents occurred during the month and were formally investigated. No incidents involving overexposure to personnel occurred.

Radiation Incident No. 578-C involved a Chief Operator whose cheek became contaminated during rupture removal operations in the discharge area at F Reactor. Details may be found in document HW-41880.

Radiation Incident No. 583-C involved contamination in the bed of a pick-up truck which had been delivered to the 1171 garage for overhaul. Details may be found in document HW-42177.

Radiation Incident No. 585-C involved the spread of particulate contamination south of the 105-F Building outside of established boundaries. The source was not definitely determined. Details may be found in document HW-42310.

Radiation Incident No. 590-C involved the spread of contamination carried by process water outside of established boundaries at 100-H Area. Details may be found in document HW-42365.

Above normal radiation was encountered and effectively handled to avoid the overexposure of personnel at the KE Reactor on March 29. Source of the radiation was VSR No. 32 which had been in the reactor for approximately 12 hours of operation. The rod was withdrawn during a 0.6 hour outage and the following

D. Radiation Experience (Continued)

dose rates resulted on withdrawal:

Rear wall of work area	3r/hour
Road between 165 and 105 Buildings	100mr/hour
105-KE Badge House	20mr/hour
Offices in 105 Building	15mr/hour

Dose rates decayed to nominal level within 12 hours.

E. Personnel Activities

At month end, 24 employees are receiving on-the-job training for engineering or supervisory assignments in the Section; six of these are on assignment under the rotational training program.

The following activities were conducted in the Reactor Areas Maintenance Sub-Section:

1. A one-week orientation course consisting of 14 classes was attended by four supervisors-in-training.

2. A training session for electrical foremen and engineers on synchronous motors for CG-558 was completed.

3. Nine exempt roll employees were scheduled for a total of 12 classes offered by the Training Group in the 700 Area.

Within the Project and Special Reactor Maintenance Sub-Section, two first line supervisors participated in the "Job Relations Training" course, one participated in "The Supervisor and Safety" course, and one attended the "Labor Management" course. Two first line supervisors attended Step II Grievance Meetings. All exempt personnel are attending the "Welding" course.

The Operations Sub-Section continued the weekly informational and instructional meetings for supervisors and chief operators. Three supervisors completed the "Job Instruction Training" course, one supervisor completed the "Job Methods Improvement" course, and two supervisors completed a course in "Conference Leading."

Within the Power Sub-Section, "Exempt Roll Training" courses were attended by 22 supervisors. In addition, 134 operators and 34 supervisors attended classroom sessions for study and training preparatory to operation of facilities to be added under CG-558.

DECLASSIFIED

E. Personnel Activities (Continued)

The Radiation Monitoring Sub-Section presented a radiation hazards orientation-type meeting for the benefit of Employment personnel. Two introductory instructional meetings were held for new supervisors in the Section to acquaint them with supervisory responsibility for radiation protection and control. Two supervisors attended the course in "Conference Leading" and one attended the "Supervisor and Safety" course.

Within the Projects and Personnel Development Sub-Section, the Projects Unit sponsored two informational programs during the month with guest speakers from other departments presenting a summary of their activities and functions. The nine members of the Projects Unit also attended the "Welding" course during the month.

The following trips and visits were conducted during the month:

L. V. Barker, Radiation Monitoring Sub-Section, left on a three month loan assignment to the Naval Radiological Defense Laboratory and will participate in Operation Redwing in the South Pacific Area.

R. D. Widrig, Projects and Personnel Development Sub-Section, and A. C. Whiteside, Power Sub-Section, visited McNary Dam to discuss application of hydraulic lifts concerning lubrication of 190-C Building pump set components.

A. L. Bement, Projects and Personnel Development Sub-Section, visited the Western Light Metals Company in Spokane in connection with Reactor Section project work.

R. J. Bursey, Projects and Personnel Development Sub-Section, visited the East Side Tool and Die Company in Portland and two other vendors in Seattle.

J. C. McLaughlin, Power Sub-Section, attended the American Power Conference at Chicago.

A. P. Vinther, Process Sub-Section, visited the Argonne National Laboratory, the Savannah River Plant, and the Brookhaven National Laboratory to discuss mutual physics and instrumentation problems.

J. E. Robb, Process Sub-Section, visited vendors in Spokane, Portland, and Seattle in connection with inspection of parts requisitioned for Project CG-651.

Richland, Washington
April 5, 1956

MANUFACTURING DEPARTMENT
SEPARATIONS SECTION
MARCH, 1956

I RESPONSIBILITY

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

II ACHIEVEMENT

A. Operating Experience

1. Statistics

a. Bismuth Phosphate Operations

	March		February	
	Normal	Acid Wash	Normal	Acid Wash
Charges started in Canyon Bldgs.	3	5	29	0
Charges completed in Conc. Bldgs.	12	6	25	0
Special charges - Conc. Bldgs.	14-IP,6-MRC		8-IP,3-MRC	
Charges completed-Isolation Bldg.	26	4	16	2
Average Waste Losses, %	5.07*		3.1*	
Special charges - Isolation Bldg.	8		6	
Material balance, %	134.04*		100.7*	
Yield through Process, %	128.97*		97.6*	
Average cooling time (days)	--		213	
Minimum cooling time (days)	--		188	

* Includes IP's.

DECLASSIFIED

DECLASSIFIED

b. Redox Operations

	March	February
Tons Uranium delivered to storage	254.2*	246.9
Average Production Rate per Operating day, tons	9.8	9.9
Average Daily Operating Rate for the month, tons	8.2	8.5
Average yield, %		
Uranium	101.3	101.0
Plutonium	104.6	101.0
Total Waste Loss, %		
Uranium	0.48	0.08
Plutonium	0.86	0.43
Average cooling time (days)	128	114
Minimum cooling time (days)	107	103
Percent down time	16.5	16.8

c. Purex Operations

	March	February
Tons Uranium delivered to storage	130.0	246.8
Average Production Rate per Operating day, tons	12.0	12.0
Average Daily Operating Rate for the month, tons	4.3	8.5
Average yield, %		
Uranium	107.0	111.5
Plutonium	91.2	109.0 corrected
Total Waste Loss, %		
Uranium	0.65	0.99
Plutonium	4.1	5.1
Average cooling time (days)	163	181
Minimum cooling time (days)	111	145
Percent down time	58	31

d. 231

	March	February
Batches started	36	24
Batches completed	39	24
Batches awaiting processing	1	13

e. 234-5 Operations

	March	February
Batches completed through Task I	131	226
Batches completed through Task II	158	238

* Includes 70.7 tons of Purex rework.

[redacted]

e. 234-5 Operations (Continued)

	March	February
Runs completed through Task III	64	101
Waste Disposal (Units)	166.0	42.4

f. UO_3 Operations

	March	February	To Date
Uranium drummed, Tons	549.37	455.44	13,362.64
Uranium shipped, Tons	508.39	506.02	13,310.69
Average cooling time, days	134	120	
Minimum cooling time, days	113	109	
Waste Loss, %	0.02est.	0.02	

g. TBP Operations

	March	February	To Date
Tons received from Metal Removal	164.70	79.51	6,716.27
Tons shipped to UO_3 Plant	167.62*	63.71	6,481.61
Average Production Rate per Operating day, tons	5.90	2.33	
Average Daily Operating Rate for the month, tons	5.41	2.20	
Average yield, %	99.09	96.80	
Total Waste Loss, %	1.56	0.93	
Ratio Actual Waste Volume returned to Theoretical Volume	1.00	2.55	
Percent Down Time	8.33	5.75	

h. Power

	200 East	200 West
Raw water pumped, gpm	4 351	5 727
Filtered water pumped, gpm	713	1 065
Steam generated, lbs/hr	103 367	187 109
Maximum steam generated, lbs/hr	252 000	252 000
Total steam generated, M lbs.	76 905	139 209
Coal consumed, tons (est.)	4 508	8 441

i. Waste Storage

	Equivalent Tons U	
	March	Feb.
Metal Waste reserve storage capacity-T Plant	83	91

* Does not include 47.91 tons Purex.

DECLASSIFIED WITH DELETIONS

DEC[redacted]IFIED

i. Waste Storage (Continued)

	Equivalent Tons U March	Equivalent Tons U Feb.
1st Cycle reserve storage capacity-T Plant	391	404
Metal Waste reserve storage capacity-B Plant	685	685
1st Cycle reserve storage capacity-B Plant	74	74
Redox Waste reserve storage capacity	488	593
Purex Waste reserve storage capacity	3 107	3 203

2. Activities

a. Redox Processing

Startup was effected on March 1, following February's month-end shutdown for equipment repairs. Rates were maintained at 10 tons of uranium per day during all periods of building operation this month. A crash shutdown was immediately necessary when the D-5, condensate stripper, failed to operate correctly due to a faulty trap. This was repaired and operations resumed on March 2.

Full scale backcycle was attempted on March 8, but was discontinued when a leak developed in a jumper on the backcycle concentrator (D-14). A complete building shutdown again became necessary on March 12, when the D-8 to 241 pump failed. The emergency backup jet for this pump also would not operate due apparently to a plug in the diversion box manifold. This line was opened when the pump was replaced. Production was resumed on March 13 and continued without interruption until the scheduled outage on March 29 for changeover from low to high MND production. Second stage backcycle was again started on March 15 after repairs were made to the D-14 concentrator. Higher than normal acid concentrations in the uranium streams were off-set by increased caustic butts to the F-1 and F-2 feed tanks. Results appear promising that this cost reduction improvement can be continued as a permanent change on the flowsheet. Flushing of columns and cell equipment is in progress at month-end.

b. Metal Recovery

1) TBP Processing

Gross output due to processing Purex rework constituted the second highest series operation monthly production to date. Net production of recovered feeds was slightly over the commitment in spite of problems with the RAX control valve air jumper and extractant flow rate difficulties.

2) UO_3 Processing

A new production record substantially surpassed the

DECLASSIFIED WITH DELETIONS

2) UO_3 Processing (Continued)

commitment this month. At month-end daily production rates of 20.0 - 22.5 tons uranium were being achieved.

3) Waste Metal Removal

Adequate tank farm removal rates were achieved this month to maintain a suitable TBP Plant feed inventory.

A fire in 271-BXR on March 5 did damage to the building and equipment of an estimated $37,000. It is believed that the fire was caused indirectly by electrical overloads due to outside transformer malfunction.

c. T Plant

During the month, processing of the remaining fourteen of the twenty-six scheduled neptunium runs was completed and all twenty-six neptunium runs were shipped off plant on March 19, 1956. Final processing of plutonium runs was completed on March 20, 1956.

Removal of the uranium metal heels from the three dissolvers was completed on March 2, 1956. Decontamination and plutonium removal from the T Plant processing tanks was initiated on the same date. A total of six acid washes have now been started, one in each dissolver section, and three in the 5-7 cell drainage catch tank. All six acid washes are currently in various stages of processing in the Canyon and Concentration Buildings. Subsequent to the processing of the three acid washes from the dissolvers, peroxide-caustic overflow flushes were started in each of the three dissolving vessels as the first of a series of flushes to effect fission product removal.

d. Isolation and Metal Fabrication

In the Z Plant 231 Building processed low MWD/T plutonium from T Plant which was isolated and converted to plutonium oxalate for subsequent handling in the 234-5 Building. The amount of material recycled was slightly higher and was attributed to a decrease in the quality of feed influenced by the special processing and cleanouts at the T Plant preparatory to shutting down of the facility.

A small amount of Purex plutonium was processed again this month. Chemical behavior and yields of the material

DECLASSIFIED WITH DELETIONS

d. Isolation and Metal Fabrication (Continued)

continued to be good although radiation from the feed as received still remains a major problem. The average exposure rates were in the neighborhood of 2400 to 3000 mr/hr. The lowest value was 1800 mr/hr, and one button read 5060 mr/hr. The feed as received from the Purex Plant evidently contains a high speed Beta radiation which is not present from feed received from the Redox facility.

e. Purex

Startup of the plant was initiated on 3-19-56 with waste cell operation. Feed to the precycle (HAF) was on stream 3-20-56 at 12 tons per day. Continuous operation was maintained through month end. In general, startup was excellent considering the extended 27 day shutdown. The final uranium product met all specifications with the exception of gamma ratios which were about 13 fold high. Initially plutonium product decontamination was poor, but before month end specification material was sent to Metal Fabrication for processing. Over-all waste losses were excessive, but during the last week of the period losses for both products were acceptable, reflecting steady state plant operation.

A major effort of decontamination and painting to effect clean-up after the February 22 incident, was essentially completed at month end. The entire sample gallery and the pipe and operating gallery (except for 180 feet in the west end) were released from respiratory restrictions. Spot cleaning and repainting of the restricted zone should result in conditional release early next month.

3. Special Operations

a. Plutonium Recovery

In the Z Plant Hoods 40 and 41 were employed in the recovery of low MWD/T scrap metals for feed back to the RMA Line. Recuplex continued the cleanout of high MWD/T material from its system during the first three weeks of March and is now processing low MWD/T slag, crucible fragments, and supernatants from Task I.

4. Schedule Variance

Redox production exceeded forecast by 22%. A sustained rate of 10 tons of uranium per day was maintained during operating periods.

TBP production was 115.6 percent of commitment and UO_3 production was 116 percent of commitment. Thirteen cars of UO_3 were shipped in March.

4. Schedule Variance (Continued)

T Plant production commitment was met.

In the Z Plant the 231 Building schedules were met without difficulty and the goal forecast for production in the 234-5 Building was completed.

Production for the month was 130 tons as compared to 175 tons forecast. Production of 444 total tons during the first quarter exceeded the commitment of 320 tons by 39 percent. Thus the shutdown this month has no unfavorable effect on the quarterly production commitment.

B. Equipment Experience

1. Operating Continuity

Downtime in Redox amounted to 123 hours. Major causes of downtime were a faulty trap in the waste condensate stripper, failure of a salt waste pump, and scheduled column flushes for changeover from low to high MWD production.

Second cycle lost 62 hours and first cycle lost 145 hours in TBP this month due to mechanical problems.

There were no process or mechanical difficulties which seriously affected the continuity of operations in T Plant.

In the Z Plant mechanical difficulties were somewhat less severe than in previous months due in part to the slower production schedule. There were no equipment failures which adversely affected the continuity of operations.

Purex downtime this month amounted to approximately 19 days to decontaminate the Sample and Pipe Galleries. Following startup no major equipment difficulty was experienced.

2. Inspection, Maintenance and Replacement

a. Cell Equipment Replacement - Redox

The B-3 heater failed due to the heating elements burning out, and the unit was replaced on 3-10-56.

A 24 hour shutdown was necessary to remove and repair a newly installed D-5 condensate jumper.

When the D-14 concentrator was started up, it was found that the Yarway trap would not pass condensate at the desired rate. Investigation showed that the trap was not set properly for the service for which it was intended. The jumper was removed and the trap was set properly.

a. Cell Equipment Replacement - Redox (Continued)

The D-8 pump failed on 3-12-56 due to a leaking shaft seal. This pump was replaced on 3-13-56 even though the new pump was 18" shorter than the one specified for this location. This pump will be used but the batch sizes of waste material has been reduced 10% to compensate for the heel the pump leaves in the D-8 tank.

The C-2 weight factor jumper developed a leak in the medium pressure leg. It was replaced with a new jumper.

b. 60 Ton Crane - Redox

Decontamination continued with special emphasis on the right side of the crane. There is still one isolated spot on the right catwalk reading approximately 2 rad. However, the general level has been materially reduced.

The light transmission of the optic system has been greatly improved since changing the left hand optic on 3-28-56.

The communication pickup shoes on the crane were changed and resulted in much better communication with crane via telephone and teletalk.

c. Equipment Maintenance - Z Plant

Significant maintenance in the Z Plant included replacement of a furnace heating unit element in Task II and thermowells and thermocouples in two furnaces of Task IV. Assistance was provided to the Metallurgy Laboratory on the Task II prototype equipment and the installation of an argon supply piping system. Other maintenance was of a routine or minor nature.

C. Improvement Experience

1. Process Tests and Revisions

a. Iodine Emission

1) Redox

Iodine control was adequate during the month except for the last few days. On 3-28-56 an emission of 3 curies was encountered and possibly can be associated with the regeneration of the A-3 reactor. There was no metal dissolution occurring at the time. Actually the dissolver heels had been removed in anticipation of the change to high MWD production. On 3-29-56 the stack sample also showed an emission of 3 curies with no activity underway in the dissolver cells. An explanation for the current emission is not yet available.

DECLASSIFIED

2) T Plant

I^{131} emissions at T Plant continued at a low level due to the small amount of metal dissolved.

3) Purex

Radio-iodine stack emissions were insignificant this month. Iodine-131 emissions experienced during the month averaged 0.009 curies per day. Attainment of these minimum figures was the result of maintaining higher off-gas temperatures through the silver reactors. This was accomplished through the reduction of dissolver heels and adoption of continuous acid addition during metal dissolution.

b. Waste Scavenging

In-farm scavenging of stored TBP wastes at the 241-CR facility was continued. The fourth tank to be processed was not suitable for ground disposal due to poor adsorption of Sr^{90} thus inhibiting ion exchange of Sr^{90} in the soil. It is planned to process TBP wastes without aluminum contamination before processing additional tanks where aluminum might be a complicating factor. By so scheduling it is possible that techniques can be made available in time to successfully process the questionable TBP wastes.

c. Button Pickling - Z Plant

Button pickling tests in water, with and without 40 kc sound waves, have been completed. It is concluded that satisfactory pickling can be obtained in an ultrasonic water bath at temperatures from 80° to 150°F in times comparable to those for nitric acid pickling. Since pickling in water results in less plutonium metal loss than pickling in acid, the reduction yields on the water-pickled buttons average 0.3% higher than normal.

2. Inventions and Discoveries

Personnel in the Separations 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

Full scale backcycle was begun this month and apparently will be feasible with the present head-end flowsheet. Completely accurate cost figures are not as yet available, but we anticipate a 20% reduction in essential material cost and a 30% reduction in waste volume.

D. Events Influencing Costs (Continued)

Although the Redox and Purex production rate, for March, was below the February level, costs for March are expected to be approximately ten percent above the February level. This increase in costs will reflect the increased salary expense for the two day longer month, increased freight charges to UO_3 for the record production achieved by this facility during the month and the increased TBP essential material consumption associated with higher rate of production.

E. Plant Development and Expansion

1. Project Status

a. CA-513-A - Purex Facility

This project is 99.99 percent complete. Remaining work consists of minor cleanup items being performed by Minor Construction and Plant forces. The installation of new car stops in the 100 Areas was started on 3-28-56. These car stops will allow the three wells of the cask cars to be loaded without turning the cars around.

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

This project is approximately 53 percent complete. Principal items remaining to be completed are Iodine monitors on the dissolver system. continuous samplers, absorptometer installation in L Cell, tank farm circulating facilities, re[illegible]ment of the 1A column, and procurement and installation o[illegible]0 ton remote crane and maintenance platform.

c. CG-598 - Purex Vacuum Acid Fractionator

This project is approximately 53 percent complete. On site construction has been suspended due to labor difficulties.

d. CG-539 - Additional Waste Storage - 241-SX

The project was closed out 3-30-56, with the following exceptions, to be completed on work order CC-8842:

1) Install instrument panel and transducers
2) Install the remaining six (6) liquid level reels
3) Remove temporary fence and temporary buildings
4) Wire in emergency power to compressors and install alarm
5) Complete a punch list of thirteen miscellaneous items

e. CG-613 - UO_3 Expansion

Construction efforts to complete 224-U cell work by May 1 continue. Beneficial use of the initial three 224-UA calciners on June 1, and the latter three on August 1 remains in the plans.

[redacted] DECLASSIFIED

e. CG-613 - UO_3 Expansion (Continued)

One calciner has been received and is currently being installed in 224-UA. Installation of the prototype calciner continues and completion is expected May 1.

f. CG-621 - Redox Contamination Control

E Cell Ozonization: Safety aspects of the ozone generating system have not yet been resolved. Installation of the hytor compressor and piping is being delayed due to higher priority work.

J-6 Precondenser: The precondenser is scheduled for delivery about 5-1-56. Installation of nozzle and kickplates and mock-up of the jumpers will require about three weeks after the condenser is received. Cold side work has been started. Completion date will be about June 1, 1956.

Canyon Wash-Down Facility: Minor Construction has drilled 27 holes in the canyon roof. Future work on the wash down facility will depend on contract negotiations.

g. CG-643 - Redox Capacity Increase, Phase III

The letter to the A.E.C. requesting the release of originally authorized funds has not yet been issued. Engineering is continuing scope preparation of the full project.

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

Detail design of the facility is nearing completion. The project proposal for construction of the facility should be approved by Washington A.E.C. about April 2, 1956.

i. CG-644 - Tail End Silica Gel Treatment

The design criteria for the silica gel has been completed and detailed design is being performed by Nickum and Sons of Seattle under contract AT(45-1)-1111, Mod. No. 1. Design is scheduled to be complete July 1, 1956.

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

It is estimated that this facility will cost $1,150,000 with a beneficial use date targeted for December 1956.

2. Plant Engineering

a. Maintenance Program

Counseling of preventive maintenance program at Purex Plant was continued.

a. Maintenance Program (Continued)

The Z Plant Preventive Maintenance program has advanced to the point of having the craftsmen make a daily report of their activities. The major fraction of the procedures necessary for preventive maintenance inspections have been completed by personnel in the Maintenance Unit.

A program for measuring maintenance functions has been developed. Currently, the system is undergoing trial in the Redox Plant with actual measurements being initiated during the week ending March 25. The one remaining measurement, labor delay as measured by work sampling, is scheduled to begin in April.

The program of formally planning and scheduling maintenance work in the Redox Plant continues with the Redox Plant Industrial Engineering assisting to work out difficulties. Currently, all jobs which involve RMU coverage, about 20% of the total work load, are being scheduled on a day-to-day basis. Plans are to expand this until only unpredictable emergencies are not included. As a by-product, the Redox Radiation Monitoring Unit indicates that this new program has aided materially in effective utilization of RMU manpower. This, as well as eventual aid to the Operations and Plant Services Units, was one of the benefits which was obvious during the original scoping of the system.

b. Cost Reduction - 200-W Laundry

The Request for Appropriation No. 56-M-83 was approved on March 6 for the purchase of new laundry machinery. A layout for the new equipment was developed and firm estimates of the installation costs obtained from the Building Grounds Maintenance Unit. Bid specifications for the new equipment have been completed and forwarded to Purchasing. The responsibility for the installation of the new equipment has been turned over to the Contact Engineer. Investigation of the storage, monitoring, bagging, and material handling operations is continuing.

c. Maintenance of Standards

Forecasts of the laboratory loads for the next six months were developed and the range of the 234-5 Analytical labor standard was extended. Labor standards are being developed for the Purex Operations and Plant Services Units. Labor Standards for the Metal Recovery Sub-Section are being revised to conform to recent process changes and production schedules.

d. Engineering Assistance

1) Purex Flange Studs

The investigation and testing program conducted to evaluate materials for Purex type flange studs has revealed that type

1) Purex Flange Studs (Continued)

416 stainless steel is far superior for this service than the 420 grade furnished with the original equipment and has been recommended for future procurement. Present spares of the 420 grade material will not be used except in an emergency.

2) Emergency Electrical Switching

Emergency electrical switching procedures for the 200 Areas are being reviewed and revised to insure that they are complete and correct, and that responsibility during future emergencies is designated.

3) Design and Drafting

Progress continues on the over-all as-built program. Items completed during the period include: 202-A cell jumpers, 202-A voltage regulator circuit diagrams, and 3-way male connector alterations.

Design work completed included: 202-S crane service platform, jet standardization, 272-W proposed building extention, and 202-A sound insulation traps for high level noise sources.

F. Reports Issued

1. Routine

Number	Subject	Author
HW-42361	Separations Section Redox Plant Sub-Section Monthly Report - March 1956	C.T. Groswith
HW-42313	Separations Section Metal Recovery Plant Sub-Section Monthly Report - March 1956	T. Prudich
HW-42304	Separations Section T Plant Sub-Section Monthly Report - March 1956	C.B. Foster
HW-42362	Separations Section Z Plant Sub-Section Monthly Report - March 1956	W.N. Mobley
HW-42346	Separations Section Radiation Monitoring Sub-Section Monthly Report - March 1956	A.R. Keene
HW-42269	Separations Section Analytical Control Sub-Section Monthly Report - March 1956	L.M. Knights
HW-42328	Separations Section Projects & Personnel Development Sub-Section Monthly Report March 1956	O.V. Smiset
Official Use Only	Separations Section Power & Maintenance Sub-Section Monthly Report - March 1956	C.P. Cabell
HW-42344	Separations Section Purex Sub-Section Monthly Report - March 1956	V.R. Chapman
None	Status of Projects, Informal Requests, Budget Items	V.D. Rouse

1. Routine (Continued)

Number	Subject	Author
HW-41734 RD	TBP-UO_3 Bldgs. Production Schedule for March 1956	H.F. Tew
HW-41733 RD	221-224-T Bldgs. Production Schedule for March 1956	H.F. Tew
HW-41732 RD	202-S Bldg. Production Schedule for March 1956	H.F. Tew
HW-41735 RD	Z Plant Production Schedule for March 1956	H.F. Tew
HW-41736 RD	Purex Plant Production Schedule for March 1956	H.F. Tew
HW-41847 RD	Six Month Goal Forecast - March 1956	H.F. Tew
HW-41764	Essential Materials Consumption for T Plant - February 1956	M.A. Thress
HW-41765	Essential Materials Consumption for TBP Plant - February 1956	M.A. Thress
HW-41766	Essential Materials Consumption for Redox Plant - February 1956	M.A. Thress
HW-41768	Essential Materials Area Report to Cost and Purchasing, Feb. 1 through Feb. 29, 1956	M.A. Thress
HW-41767	Essential Materials Planning - March 1 through March 31, 1956	D.E. Peterson
HW-41812	Separations Section Waste Status Summary for February 1956	D.E. Peterson
HW-41809	Purex Plant - Process Control	T.R. Workinger C.F. Yuenger D.E. Braden
HW-41837	Liquid Waste Disposal Control at Purex	C.R. Anderson C.F. Yuenger
HW-42252	Analytical Control Quality Report	A. Brunstad C.G. Hough

2. Non-Routine

HW-41898	Radiation Incident, Number 102-C	R.D. Anderson
HW-42291	Radiation Incident, Number 104-C	D.R. Koberg
None	Inert Gas Study for Purex Plant	M. Pociluyko
None	Trip Report - Motion Time Survey Instructors Course, Schenectady, N.Y.	P.J. Norderhus
HW-42209	Purex Plant Estimated Loss - March 21, 1956	V.R. Chapman
None	Purex Plant Pipe and Operating Gallery Contamination Incident	V.R. Chapman

III PERSONNEL

A. Force Summary

[redacted]

DECLASSIFIED

DECL[redacted]ED

A. Force Summary

	Start of Month	End of Month	Net Change
Section General	1	1	0
Redox Plant Sub-Section	222	226	+4
Metal Recovery Plant Sub-Section	247	251	+4
Z Plant Sub-Section	179	179	0
T Plant Sub-Section	110	96	-14
Purex Plant Sub-Section	276	274	-2
Power & Maintenance Sub-Section	318	315	-3
Projects & Pers. Dev. Sub-Section	57	56	-1
Analytical Control Sub-Section	229	223	-6
Radiation Monitoring Sub-Section	160	159	-1
Section Total	1799	1780	-19

B. Safety

There were no disabling injuries incurred by Separations Section personnel during the month of March.

C. Radiation Experience

Cleanup of the Purex Plant L cell blowback proceeded satisfactorily. All surfaces in the P & O Gallery were covered with at least one coat of paint. At month's end essentially all surface contamination was fixed with the result that airborne plutonium contamination was reduced to normal. The sample gallery was returned to its normal status. Plutonium contamination which was deposited in the Purex swamp as a result of this incident fluctuated by a factor of 10^4 and reached a maximum of 1.1×10^{-6} mc Pu/ml. Internal plutonium deposition in the chief operator, who was exposed to the blowback in the Purex P & O gallery, was estimated to be less than 10% of the MPL.

A process operator received a localized dose to the skin of 5 rads during sampling operations at T Plant. The coverall contamination of 24 rads/hr (uncorrected), which caused the exposure, was discovered within 5 minutes. In another case of localized exposure above the permissible limit, a laboratory assistant received a skin dose of 2-5 rads from the spotty coverall contamination of 300 mrads/hr (uncorrected), which was discovered within 15-30 minutes.

Iodine emission totalled 15.6 curies; essentially all from Redox.

D. Personnel Activities

1. Programs

During the month the training program activities were as follows:

1. Programs (Continued)

Program	Attendance
For Exempt Roll:	
Information on Time Card Training	59
For Non-Exempt Roll:	
GE Selection Program	8 (4 Oper, 1 RM, 3 P&M)
Pre-Supervisor Training	38
Orientation Training (Rotational Personnel)	4

The program for advanced disaster-evacuation training has been developed and the course is scheduled to start for Section personnel in the near future.

A program for the presentation and instruction of the principles of Motion Time Survey were initiated this month. Members of the Industrial Engineering Unit began participation in an advanced or so called application course this month to qualify them as analysts. Intermediate and orientation courses are being prepared for offering to appropriate supervision and management.

2. Reduction of Force

During March the Section forces were reduced by 19 people, with transfers to other Sections and Departments accounting for 31 people (12 RM, 8 Utility Operators, 2 Clerical, 5 Craft, 1 Exempt and 3 Analytical people) and removals from payroll accounting for 14 people (8 illnesses and 6 resignations). Twenty-six people transferred into the Section (4 reactivations, 1 new hire, 14 RM, 3 craft, and 4 Engineering Assistants returning to Separations). As of March 31, 1956, the Section force totaled 1780 people.

3. Practice Evacuation

A practice evacuation was held on March 15 in both the 200 East and 200 West Areas. All personnel were evacuated except those necessary to maintain production. The evacuation was completed without incident.

4. Visitations

P. J. Norderhus returned to HAPO on March 5 following six weeks in Schenectady, New York while attending an instructors course in Motion Time Survey.

DECLASSIFIED

DEC[redacted]

HW-42219 DEL

April 6, 1956

ELECTRICAL UTILITY SECTION

MONTHLY REPORT

March, 1956

I. RESPONSIBILITY

There were no changes in Section responsibility.

II. ACHIEVEMENT

A. Operating Experience

Power Statistics (See last page for details)

Plant Contract

Probable time of March Peak. . . .2:00 - 2:30 p.m.,	March 28, 1956
Telemetered peak for March	187,000 KW
Probable Billing Demand for March.	196,000 KW
Probable energy consumption for March.	118,900 MWH
Actual BPA Metered Demand for February	183,814 KW
Actual Billing Demand for February	196,000 KW
Actual Energy Consumption for February	111,900 MWH
Average monthly energy consumption-8 months of Fiscal Year '56.	108,912 MWH
Cost of purchased electricity for February	$286,573
Actual cost of purchased electricity for 8 months of Fiscal Year '56.	$2,172,858

* * * *

The peak demand of 187,000 kw established an all-time record for the HAPO plant. A potential peak demand of 197,000 kw was not attained as one operating area was down at that time.

* * * *

[redacted]

A. Operating Experience Cont'd.

Momentary surges occurred on the 230-KV system on March 6 when McNary Dam lost two generators, on March 11 when BPA's Moxie-Union Gap line relayed out, and again on March 26 when lightning hit two Bonneville-Vancouver lines. There were no adverse effects upon plant production.

* * * *

A 21-minute power outage to the 231-W and 283-W Buildings occurred at 1:28 p.m. on March 3 when two phases of a 2.3 kv feeder swung together tripping the breaker. Longer crossarms were installed for this span on March 5 in order to spread the wires.

Sixteen spans of the disused 66 kv transmission line near the 300 Area blew over on March 2 and was cleared away the following week by line crews.

There were no serious incidents occurring on the electrical system during the 70 MPH winds of March 1, 2, and 3.

* * * *

Normal power to the 2700-W Buildings, Meteorology Building and part of the 224-T, 221-T, and 282-W Buildings was momentarily lost at 8:22 a.m. on March 22, when a circuit breaker in the 252-W substation was inadvertently tripped.

* * * *

B. Equipment Experience

Maintenance electricians replaced the upper insulating porcelain of a Westinghouse 230 kv oil circuit breaker bushing which had been taken out of service when a routine test with Doble equipment indicated a high power factor. Subsequent tests had revealed a fine crack in the porcelain. The repaired bushing tested normal and was placed in spare parts.

* * * *

Due to a fire in the 271 BXR Building in 200-E Area, power was switched out at 5:28 a.m., March 5. A 200 kva Gardner transformer had failed and apparently impressed a high voltage upon equipment within the building, causing the fire.

DECLASSIFIED

D. Events Influencing Costs

Overtime hours expended were approximately 1.4 per cent of the total regular hours worked.

Attendance for the month was 97.63 per cent.

E. Plant Development and Expansion

CA-586: After a meeting held with the BPA and AEC, arrangements were made with the Reactor Section for a sixteen hour outage April 11 on the No. 1 Hanford 230-KV line in order to make line and equipment rearrangements at the Midway Substation terminal.

CG-558: Construction forces completed the test run on the seventh 4,500 HP motor at 100-B Area.

F. Significant Reports

CONTRACT Ibp-3927 - ELECTRICAL POWER DEMANDS, March 29, 1956, O. Mageehon to AEC. The HAPO recommendations for contract schedule of monthly power levels for fiscal year 1957.

III. ORGANIZATION AND PERSONNEL

A. Organization

No changes in structure or nomenclature.

B. Force Summary

	Beginning	Ending	Net
Exempt Personnel	16	16	0
Dispatchers	5	5	0
Electricians	11	11	0
Linemen	22	23	1
Substation Operators	31	31	0
Secretary	1	1	0
Stenographer	1	1	0
Clerks	2	2	0
Draftsman	1	1	0
	90	91	1

[redacted]

[redacted]

C. Safety Experience

Five medical treatment injuries were reported during the month, two of which were "foreign particle in eye."

* * * *

Twenty-five linemen and maintenance electricians completed a three-series inoculation for Rocky Mountain fever.

D. Radiation Experience

No incidents were reported during the month.

E. Personnel Activities

The Hanford News publication of March 2, 1956, presented a two page pictorial coverage of Electrical Utility Section personnel and functions.

* * * *

At the Section monthly meeting, W. P. Allen of Personnel Practices reviewed the revised Insurance and Pension Plans after four months of operating experience. Employees' participation and case exceptions indicated that future periodic reviews will be beneficial.

O. Mageehon
ELECTRICAL UTILITY SECTION

O Mageehon:btz

[redacted]

DECLASSIFIED

DECLASSIFIED

DEL

HW-42219 DEL

POWER STATISTICS
ELECTRICAL UTILITY SECTION
FOR MONTH ENDING MARCH 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)	24660	27110	51400	50000	68.9	72.9
A-4 Out (100-D)	13830	15990	28300	29100	70.2	73.8
A-5 Out (100-H)	8770	9850	15900	15750	79.2	84.1
A-6 Out (100-F)	6000	6400	14300	13200	60.3	65.2
A-7 Out (100-KW)	23424	23088	41000	36500	82.1	85.0
A-8 Out (200 Area)	7020	7140	11000	10500	91.7	91.4
A-9 Out (100-KE)	22800	24480	38500	40000	85.1	82.2
TOTAL OUT	106504	114058	200400*	195050*	--	--
MIDWAY IN	108860	116020	178400	180800	87.7	86.2
115 KV System (300 Area)						
BB3-S4 Out	2472	2584	4640	4640	76.5	74.8
115-66 KV System						
B7-S10 Out (W. Bluffs)	339	258	810	810	60.1	42.8
Hanford Out (7200 V.)	48	43	--	--	--	--
Hanford In	377	304	1100	1100	49.2	37.1
Project Total In	111709	118908	184140*	186540*	--	--

* Denotes Non-Coincidental Demand

Average Power Factor - 230 KV System 86.9

[redacted]

MANUFACTURING DEPARTMENT
PURCHASING AND STORES SECTION
MONTHLY REPORT MARCH, 1956

I Responsibility

The Purchasing Sub-Section has assumed the responsibility for the placement of A.E.C.'s requisitions for materials which are available from GSA or on other Government Contracts.

II Achievement

As shown below withdrawals from the General Supplies inventory during the month amounted to $430,427 involving 38,942 store orders. This is the largest amount ever disbursed in any one month.

STATISTICS

	January	February	March	FY 1956. Average
Purchasing				
Emergency requisitions rec'd	401	370	349	401
Average per day	19.1	17.6	15.9	19.0
Purchase orders placed				
Number	2,693	3,051	2,706	2,437
Value	$2,555,355	$2,120,561	$2,210,182	$2,069,766
Purchase order alterations				
Number	281	291	335	278
Value	$ 349,652	$ 325,801	$ 144,203	$ 282,023
Stores				
General Supplies				
No. of store orders	27,458	32,470	38,942	30,343
Value of issues	$ 287,624	$ 324,764	$ 430,427	$ 320,292
Spare Parts				
No. of store orders	1,855	2,198	1,677	1,507
Value of issues	$ 97,225	$ 203,725	$ 186,622	$ 127,492
Traffic				
Savings freight bill audit	428	677	1,130	1,711
No. freight bills approved	1,714	1,753	1,763	1,599
Amount	$ 300,529	$ 323,107	$ 330,572	$ 324,945
Carload shipments received	889	968	905	869
Tonnage report				
Tons rec'd by common carrier	58,122	63,426	60,300	55,975
Total cost	$ 322,163	$ 351,247	$ 341,512	$ 316,383
Average cost per ton	$ 5.543	$ 5.538	$ 5.663	$ 5.652

II Achievement (Cont.)

A possible work stoppage on April 1, 1956 at a vendor's plant in Tacoma, Washington threatened the scheduled completion date of Project CG-558 because of one order for venturis required in all plant areas involved in this Project. On March 29, arrangements were made to move necessary material and equipment for the production of the items on order from the vendor's plant to a General Services Administration Warehouse. A Purchasing representative was sent to Tacoma to coordinate the necessary action. However, through attendance at meetings with Union and Management representatives on March 29, there was virtual assurance there would be no work stoppage unless the union membership voted otherwise that evening. The union members endorsed the proposed settlement thus obviating the move of material and equipment and assuring full production on the order.

Of 39 requisitions received on Projects CG-647, Radioidine Removal, and CG-648, Purex, 27 were assigned to buyers for securing quotations prior to AEC approval of the projects. This is an expedient to save procurement time on critical and long-delivery equipment pending AEC approval.

Two instances arose in which project equipment has suffered unusually high maintenance costs. Purchasing personnel have arranged and attended meetings between manufacturers' representatives and maintenance personnel in order to locate and solve the problems. One instance was the case of alum feed pumps in 100-K Area, with Proportioneers, Inc. Another instance was valves installed in Purex Building, with Hills-McCanna as the manufacturer. Both meetings resulted in a resolution of the problems either by rework by the vendor or by a change in installation or operating methods.

Performance of vendors is receiving constant attention. A review of the performance of 20 vendors has been made and letters have been written to point out their records on late deliveries, percentage of delinquencies, and the Company's opinion of their performance. This approach has been successful in securing letters of appreciation and promises to improve.

Snow and rain water coming from the adjacent hills into the Columbia River has created turbidity conditions in the water that have never been experienced at Hanford. As a result, Philadelphia Quartz has been asked to bring in a number of tank truck loads of sodium silicate. They complied and assumed a portion of the tank truck rates. As an example of the consumption of silicate, the purchase order for 2,090 tons to be delivered over a period of three months was taken in approximately 1 month. Silicate will be used at a high rate until this water condition is over.

The 100-Areas were concerned about the cost of solid aluminum dummies. Through discussions with vendors and plant personnel specifications were relaxed to the extent that the vendors could receive bar stock without wrapping which had been costing about three cents per foot. This factor and less labor reduced the unit cost by some nine cents, which resulted in a savings of approximately $3600 on the lot of 40,000 dummies.

A system for placing blanket purchase orders with local suppliers has been effected to reduce the petty cash fund and frequent trips to Pasco and Kennewick. During March, four such orders were placed for monthly maximum amounts of $200 to $300, with delivery promised by the local vendor directly to Stores within 24 to 36 hours after notification of the requirement.

II Achievement (Cont.)

Contracts executed during month

RO-27
Seller: Stauffer Chemical Company
Material: Dry Aluminum Sulphate
Quantity: Minimum 1,375 tons, Maximum 5,500 tons
Term: April 1, 1956 - March 31, 1957
Prices: $297,275.00 ($37.25 per ton F.O.B. Richmond, California)

G-24 Modification No. 2
Seller: Washington state College
Service: Acquisition of pigs
Term: March 1, 1956 - February 28, 1957
Price: None
Mod. 2 - Extends term

SA-4
Seller: Washington Transit Advertising
Service: Transit Advertising in Hanford Works Buses
Term: February 1, 1956 - January 31, 1959
Price: 40% of gross collections with a minimum $20 per month to be paid to General Electric.

SA-7
Consultant: R. W. Beck & Associates
Service: Appraisal of Telephone Facilities
Term: March 12, 1956 - July 16, 1956
Price: $15,300

CA-131
Consultant: Dr. S. T. Cantril
Service: Health and Safety consulting service
Term: February 29, 1956 - February 28, 1957
Price: $100 per day for services performed

CA-132
Consultant: Dr. P. E. Kendall
Service: Cardiological Consultant Services
Term: March 1, 1956 - February 28, 1957
Price: $75 per month

CA-GE-2
Consultant: Booz, Allen & Hamilton
Service: Management Consultant Services
Term: All work to be furnished not later than March 1, 1957
Price: Not to exceed $200 per employee appraised; transportation costs and subsistence expenses. Contract not to exceed $2000 unless authorized by HAPO's General Manager.

DDR-No. 2
Seller: Sciaky Bros. Inc.
Service: Research, develop and design method of zirconium welding
Term: March 1, 1956 - October 1, 1956
Price: $1500

II Achievement (Cont.)

Excess automotive and heavy construction equipment with an acquisition value of about $500,000 will be offered at public auction on April 23, 1956. This will be the first sale by General Electric after accepting responsibility for disposal of excess from the Commission. In addition to newspaper advertising some 2000 brochures were sent to prospective bidders. The auctioneering firm of Karp and Karp was awarded the contract to "cry" for the sale.

A physical count of the reserve stock of Government owned compressed gas cylinders located in Stores Yard #2 totaled 2428. As this is an excessive reserve, arrangements were made with AEC to ship 1000 cylinders off-site. Negotiations are under way with AEC to excess another 500.

A special work shift (4:28 A.M. to 6:30 P.M.) was established during the month to provide coverage for disbursing safety shoes to HAPO employees who were formerly experiencing difficulty in making purchases in person due to shift change times.

Segregation of spare parts into two account categories; Special Process Spares (Account 0410) and Continuity of Operations Spares (Account 0409) was completed during the month. As a result of this segregation 4,016 items valued at $276,616.00 were established in the 0409 account. Physical segregation of stock has not as yet been made.

III Organization and Personnel

Force Summary

Component	Ex.	N. Ex.	T	Ex.	N. Ex.	T	Ex.	N. Ex.	T
General	2	2	4	2	2	4	-	-	-
Contract Unit	2	2	4	2	2	4	-	-	-
Traffic	3	6	9	3	6	9	-	-	-
Purchasing Sub-Section	44	65	109	44	63	107	-	(2)	(2)
Stores Sub-Section	12	157	169	12	164*	176	-	7	7
	63	232	295	63	237	300	-	5	5

*Includes 5 employees from Metal Preparations on a temporary basis.

Safety Experience

Four medical treatment injuries were reported.

Eleven safety and security meetings were held with a total of 291 employees attending.

[redacted]

TRANSPORTATION SECTION
MONTHLY REPORT
March 1956

Transportation Section personnel forces decreased from 491 to 488 by one new hire, three transfers in, four terminations, two transfers out, and one deactivation - personal illness.

Transportation Section gross expenditures for the first eight months of FY 1956 totaled $2,720,418 which is an increase of $24,730 or 0.92% over FY 1955. Fiscal year to date costs are under the budget by $43,147 or 1.56%. The following indicates comparative costs by major service functions:

Function	FY 1956 1st.8 mos.	FY 1955 1st. 8 mos.	% of Variance
Railroad	$ 504,394	$ 514,232	- 1.91 %
Plant Bus	951,139	890,994	+ 6.75 %
Heavy Equipment Maintenance	394,837	374,984	+ 5.29 %
Light Equipment Maintenance	407,260	440,304	- 7.50 %
Road Maintenance	129,339	78,575	+ 64.61 %

Listed below are unit cost statistics for the first eight months compared with the performance bogeys for FY 1956 and FY 1955 actual:

		FY 1956 1st 8 mos.	FY 1956 Bogey	FY 1955 Actual
Railroad				
Cost per car handled -	Commercial	$ 32.85	$ 29.73	$ 31.46
	Process	241.05	232.40	241.89
	Average	55.20	52.34	52.97
Plant Bus				
Cost per mile -	Operating	.3951	.4173	.4043
	Maintenance	.1359	.1281	.1268
	Total	.5310	.5454	.5311
Light Equipment				
Cost per mile -	Maintenance	.0627	.0689	.0614
Road Maintenance				
Cost per mile - yearly (Primary roads based on 20' roadway - seal coating not included.)		423.23	317.74	250.67
Seal coating - per square yard for surfaced areas		.0905	.1108	.1134
Track Maintenance				
Cost per mile - yearly		2,545.46	2,577.18	2,698.82

DECLASSIFIED [redacted]

DECLASSIFIED

Transportation Section

Preparation of budgetary data for the last half of FY 1956, FY 1957 and FY 1958 is essentially complete. Listed below are the revised operating budget estimates for FY 1956 and FY 1957 for comparison with the FY 1956 Midyear Review and FY 1955 actual:

	FY 1955 Actual	FY 1956 M.Y.R.	FY 1956 Rev.Est.	FY 1957 Budget
Section Total (gross)	$4,062,815	$4,158,766	$4,104,545	$4,279,027
General	50,686 1)	62,361	105,204 3)	161,500 4)
Rail Operations	753,968	772,209	765,699	815,134
Bus Operations (gross)	1,485,796	1,575,571	1,553,948	1,633,328
Heavy Equipment Maintenance	1,032,448	1,082,048	1,060,195	1,110,183
Light Equipment Maintenance	971,768	939,661	913,478	925,699
Track Maintenance	384,142	372,975	372,643	388,977
Road Maintenance	836,642	843,164	856,086	883,718
Records and Equipment Control	86,974	92,290	87,399	97,924
Landlord - C.T.F.	66,809 2)	111,424	112,649	102,000
Landlord - 600 Area	28,937	29,004	21,951	22,200

1) Includes proration from Manufacturing General for only ten months.
2) Last six months only.
3) Includes liquidation for the last six months from Records and Equipment Control.
4) Includes liquidation for the full twelve months from Records and Equipment Control.

Increases in FY 1957 are generally due to higher salary and continuity of service rates plus greater requirements for personnel and material in certain units.

Completed the Automotive and Heavy Mobile Equipment Budgets for FY 1957 and FY 1958. Requirements in FY 1957 total $1,019,005 consisting of $865,850 for replacements and $153,155 for additions. Requirements in FY 1958 total $1,427,925 consisting of $1,401,425 for replacements and $26,500 for additions. A major item in the FY 1958 Budget is twenty-five 53-passenger buses to replace thirty-one 41-passenger units manufactured in 1948.

Delivery of 288 new replacement sedans and pickups was begun in March and will continue throughout the next three months to permit an orderly flow through the shop without seriously affecting other work. The unit price on sedans was $1,301.70 and on pickups $1,189.61 compared to the appropriation estimate of $1400 per vehicle. This difference decreases the total anticipated expenditure by $43,218.37.

Vehicles replaced by upgrade or new equipment are being readied for excess. The Commission has requested that all possible units be released for the auction sale in April.

Repair estimates as requested by the Commission have been completed on some 175 units in the HOO Reserve Construction Equipment Pool. Twenty-six of these units have been declared uneconomical to repair and will be transferred to the Minor Construction Account for inclusion in the coming sale.

[redacted]

Transportation Section

A civil defense test evacuation of Richland schools was accomplished on March 5 with excellent results. Only twenty-five minutes were required from the Bus Terminal to the schools and thence to the city limits. Another phase of this exercise involved the movement of the mobile control center from storage at the Prosser Barricade to the No. 4 Staging Area at Whitstran, Washington. A full report on this activity has been submitted to the Commission.

Facilities were provided at the Commission's request for a Drivers Test Clinic on March 15 and 16. The clinic was attended by approximately 35 people, representing several governmental agencies. The purpose of the meeting was to develop a uniform testing system for the issuance of government operators permits to civil service personnel. Section representatives who are engaged in performing this service for the Commission also attended.

Recommendations on Disabling Injury No. 56-115 are receiving continuing attention with the following being accomplished to date:

a. The Engineering Department has completed the requested feasibility study of flashing light signals at 34 major plant railroad crossings. The study was reviewed by the Central Safety Council and funds of $360,000 are being budgeted for FY 1957.

b. Partial shipment of the dual horns and oscillating lights to be installed on each locomotive has been promised by May 1.

c. Installation of posts to mount the "Reduce Speed Zone" signs at railroad crossings has begun. The signs have been ordered and delivery is expected about April 26.

Inventory balances at 2-29-56 for Motor Vehicle parts and Heavy Mobile and Construction Equipment parts were up $3,289 due to the early cutoff on withdrawals. The present balance is $27,066 above the annual goal for 1956, of which $13,287 resulted from the inventory adjustment in January. Overstocked and obsolescent items earmarked for excess plus the planned transfer of White bus parts to the CWIP account in White Bluffs will bring this category near the desired level. It is contemplated that this action can be accomplished by the end of the current fiscal year.

An analysis of maintenance, operating, and ownership costs on the HAPO sedan fleet has been made for comparison with private enterprise. This study included depreciation, interest, profit, insurance, and a contingency factor, in addition to the normal reportable expenditures. HAPO rates are 17% under Hertz and 15% under Associated General Contractors. The actual difference is probably greater in that HAPO costs were purposely computed on the high side to preclude understating and unfair comparisons.

Reviewed all work orders during CY 1955 where the 700 Area Maintenance Unit had performed services for the Transportation Section. This work, totaling approximately $70,000 for labor and IME, was classified by crafts and summarized by man-hours and labor expense for each craft. The survey was performed for and in cooperation with the Metal Preparation Section.

The project proposal for Change House Facilities in the 275-W Building, 200-West Area, for the Transportation Section has been approved at a total cost of $34,700.

DE[redacted]

DECLASSIFIED

Transportation Section

The decontamination facility operated by the Transportation Section in the 200-West Area for cleaning HO vehicles has been reactivated. This service will be required on a full time basis for the replacement program in progress.

Bus service was established on March 15 for approximately 55 General Electric employees at White Bluffs due to the strike of the teamsters craft and other Minor Construction personnel. The strike also necessitated the storage of Minor Construction stores material in the 101 Building, Hanford, as no deliveries are being made to the White Bluffs Area.

Commercial rail traffic during March decreased 7.8% over February. The following recapitulation indicates the distribution of commercial cars handled:

Cars Handled -	Loads In	Empties In	Loads Out	Empties Out
General Electric Company	944	13	13	977
U. S. Army	3	0	0	2
L. H. Hoffman Co.	1	0	0	1
E. P. Irwin Co.	0	0	0	2
Frank Lohse Co.	1	0	0	1
Morrison-Knudsen	0	0	0	1
	949	13	13	984

Railroad process service during March decreased 62.5% over the record number of movements in February. March movements were extremely low until the Purex Facility resumed operation late in the reporting period.

Railroad car movements consisting of process, commercial, and special service totaled 2163 in March compared to 2635 in February and 2278 in January.

Maintenance of railroad trackage and associated activities required 5989 man-hours. Favorable weather conditions during the reporting period permitted considerable surfacing and dressing work.

Overflow from a waste crib has contaminated the 184-F railroad track roadbed. A study underway indicates probable replacement of the railroad ballast.

The Plant Bus System transported 11% fewer passengers in March than in February due to the shorter reporting period and improved weather. The following recapitulation indicates the volume of service rendered:

Total Passengers	169,041
Revenue - Bus Fares	$ 7,890.87
Earnings - Transit Advertising (February)	$ 200.35
Bus Trips	6,560
Bus Miles - Passenger Carrying	207,402
Passenger Miles	5,932,033

The day shift to-home express bus service has been further expanded with the addition of a through bus from 100-D for the Wright Shuttle route and from 200-East for the Goethals Shuttle route.

[redacted]

[redacted]

Transportation Section

The Richland Bus System transported 25.7% fewer passengers in March than in February due to the shorter reporting period and improved weather. The following recapitulation indicates the volume of service rendered:

Total Passengers - Including Transfers	13,484
Revenue - Bus Fares	$ 721.84
Earnings - Transit Advertising (February)	$ 9.11
Bus Trips	984
Bus Miles - Passenger Carrying	5,215
Passenger Miles	33,702

Off Plant chauffeured automobile trips (Company business and/or official visitors) totaled 201 which were rendered to the following locations:

AEC Airport	1
Benton City, Washington	12
Enterprise, Washington	1
Grandview, Washington	1
Hinkle, Oregon	7
Kennewick, Washington	58
Mabton, Washington	1
Pasco, Washington	61
Pendleton, Oregon	29
Prosser, Washington	1
Spokane, Washington	1
Sunnyside, Washington	7
Walla Walla, Washington	1
West Richland, Washington	8
Yakima, Washington	12

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

	Gasoline	Diesel Fuel	50 Cetane	Kerosene	White Gas
Stock at Start of Month	55,875	20,420	11,200	3,546	250
Received During Month	129,582	25,079	40,484	3,720	0
Disbursed During Month	122,512	22,094	43,984	3,616	18
Stock at End of Month	62,945	23,405	7,700	3,650	232

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

Motor Overhauls	47
Class A Inspections and Repairs	82
Class B Inspections and Lubrications	1028
Weekly Inspections - Fuel Trucks and Off Plant Vehicles	115
Semimonthly Inspections - Buses	237
Monthly Inspections - Railroad Rolling Stock	11
Front End Alighment and Wheel Balance	115
Routine Maintenance Repairs and Service Calls	1965
Accident Repairs and Paint Jobs	50
Tire Repairs	644
Wash Jobs	315
	4609

DECLASSIFIED

[redacted]

[redacted]

A comprehensive check-up on all fifth wheel assemblies on truck-tractor units has been completed following the recent failure which disclosed the inadequacy of the previous inspection routine.

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

Code	Type	No. of Units	Total Mileage
1A	Sedans	334	436,943
1B	Buses	162	225,935
1C	Pickups	405	221,869
1D	Panel,Carryall,Sta.Wagon	168	137,141
1G	Jeeps	3	971
1H	Power Wagons	49	22,031
68 Series	Trucks	199	92,104
		1320	1,136,994

Completed the erection of civil defense highway directional signs.

Inspected Security and Patrol Sub-Section facilities in the 600 Area regarding immediate and future building maintenance and occupancy. Clean-up activities in the vicinity of White Bluffs and the general 600 Area required 412 man-hours.

Maintenance of Plant roads and the production of road aggregate materials required 1188 man-hours.

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

	MC 3	MC 5
Stock at Start of Month	33.88	33.39
Received During Month	0	0
Used During Month	0	0
Stock at End of Month	33.88	33.39

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

	3/4"to 0 Pre-mix Tons	¼" to 0 Pre-mix Tons	5/8" Chips Cu.Yd.	1/4" Crushed Rock Cu.Yd.	3/4" Crushed Rock Cu.Yd.
Stock at Start of Month	0	4	968	53	1,518
Made During Month	0	0	963	0	240
Used During Month	0	0	14	4	200
Stock at End of Month	0	4	1,917	49	1,558

[redacted]

ENGINEERING DEPARTMENT

MARCH 1956

PILE TECHNOLOGY SECTION

Four charges of I & E slugs and four charges of standard slugs were charged into the C Pile to evaluate the heat transfer characteristics and conversion ratios attainable with these internally and externally cooled fuel pieces.

Measurements of the nuclear lattice parameters and cold clean conversion ratios in I & E slugs typical of the design used in the C Pile tests, indicate that the conversion efficiency is essentially the same as for solid fuel elements.

Dimensional measurements on the non-rupture cored enriched slugs with 3/8" and 5/8" core diameters revealed that both types of fuel elements split inside the can with equal severity, although the 5/8" pieces had experienced twice the exposure of the 3/8" piece.

A water-mixing slug which gives a mixing efficiency of approximately 75 percent has been selected for in-pile testing as a means of counter-acting high surface temperatures caused by low ribs in corroded process tubes.

During the special outage at H Pile on March 9 and 10, bore diameter measurements and borescope observations were made to determine the extent of graphite radiation damage and its contribution to the tube replacement difficulties. Results indicate that there is no evidence of graphite radiation damage at H Pile which is unique or more serious than at other HAPO piles.

The feasibility study on the Army gas loop was completed and the preliminary design, cost estimate, and schedule transmitted to the AEC. Including contingencies and escalation costs, the total cost for the loop was estimated to be $731,000 with a 20-month period to cover time after authorization until the test loop would be ready for use.

The Lattice Test Reactor has been used to measure the multiplication constants of graphite uranium lattices. This month it was proved that sufficient flexibility has been provided to adjust the neutron energy spectrum so that multiplication constants can be determined for a large range of lattices.

SEPARATIONS TECHNOLOGY SECTION

A new Redox flowsheet for processing high MWD/T was issued. The new flowsheet incorporates revisions designed to eliminate potential critical mass problems in two phase systems in the plutonium cycle feed tanks. Two-stage backcycle of wastes was instituted during the period and decontamination and losses were excellent. Partially decontaminated Purex products were worked off successfully. The Purex process was started following clean-up of the operating gallery contamination. Decontamination of plutonium was within specifications and uranium product was about 5-10 times goal activity. Losses were excellent under steady-state conditions and at the end of the period uranium product quality was improving.

DECLASSIFIED

Purex studies in the Hot Semi-works were directed toward achieving improved decontamination conditions for application to the plant process. Operation of scrub sections at a point closer to flooding was found to improve decontamination by a factor of 3. Cold semi-works studies are underway to determine a much-improved design for the Purex A-type column.

Laboratory studies using Versene in Purex process streams have indicated that substantial improvement in decontamination factor may be possible. The agent was also found to be effective in removing zirconium-niobium activity from used solvent.

All of the material required for the fabrication of the prototype calciner is now on site and assembly is approximately 85% complete.

DESIGN SECTION

Design Section effort on design development programs increased during March as personnel became available following completion of a majority of the FY-1958 Plant and Equipment Budget studies. Engineering manpower assigned to Design Section-managed projects also increased due primarily to Advance Design - Reactor Plant. Customer design order activity was down substantially from the February level. Distribution of effort by major component is as follows:

	Percent of Total Effort
Design Development Programs	26.3
Design Section-Managed Projects	49.7
Advance Studies - FY 1958 Budget	4.3
Process Technology	5.9
Customer Work	13.8
	100.0

Engineering effort on the Metallurgical Design Development Program was greatly accelerated during March. Major emphasis involved engineering feasibility studies for expanding present 313 Building canning areas to accommodate additional fuel element fabrication facilities which would be required for a supplemental production reactor.

Major reactor design development effort during March included preliminary design studies for supplementary production reactor plants, studies of the application of pressurization and recirculation as a method of increasing production capacities of existing reactors, investigation of the application of improved drying agents for reactors, and the evaluation of prototype flow monitoring and temperature monitoring system components.

Preparation of the Engineering Department submission of the Plant and Equipment Projects Budget for FY 1958 and Revised Budget for FY 1957 was substantially completed during March. A preliminary budget summary, together with a preliminary project budget data sheet document (HW-42059, Parts I and II), were issued for review by Using Department Managers prior to final submission to the Financial Department in April.

Work was started on a project proposal for the design and installation of a semi-works facility in the Fuel Element Pilot Plant to produce lead-dip processed internally and externally cooled fuel elements.

PROJECT SECTION

At the end of the month, completion status of major construction was as follows:

Project No.		Completion Scheduled	Completion Actual
CA-512	1706 KER Recirculation Facilities	89%	79%
CA-513-E	Purex Facilities, Part E	94%	94%
CA-546	Fuel Element Pilot Plant	99%	98%
CG-558	Reactor Plant Modifications, Phase I	49%	53%
CG-558	Reactor Plant Modifications, Phase II	7%	10%
CA-586	First Capacity Increase, 230 KV System	97%	89%
CG-598	Purex Acid Fractionator	48%	53%
CG-600	100-C Alterations	0	0.8%
CA-613	Hanford 4X Program, Metal Conversion Plant	62%	55%
CG-621	Redox Contamination Control Facilities	39%	38%
CG-643	Redox Capacity Increase, Phase III	86%	86%

A strike by teamsters, operating engineers, and cement finishers was begun on March 22, 1956, and the general issue was the discarding of the Hanford Works Agreement. All Minor Construction work was essentially stopped, and progress by other construction forces was reduced drastically. As a result of the reduced workload, 76 Project Section employees were given notices of a temporary layoff to be effective March 30, 1956; however, 44 were placed in temporary assignments, seven went on vacation, and four married women declined assignments in deference to men who were heads of families.

The inspection workload increased slightly during the month because of more orders and also because some orders were divided among vendors' plants. As of March 23, 1956, there were 506 orders for items requiring inspection, of which 474 had been assigned to inspectors.

ADVANCE ENGINEERING SECTION

A general conclusion, arising from the preparation of the Supplementary Construction Budget Document and the Research and Development Program Proposal for FY 1957 and 1958, is that the construction of new reactors is economically attractive as compared to the modification of existing reactors when the object is increased production capacity.

A preliminary study has been made of the use of organic liquids for cooling Hanford-type reactors, the principal advantage being the non-corrosiveness of these liquids for uranium and other pile materials. According to available information, the radiation damage of diphenyl will be a minor problem in Hanford reactors. The use of diphenyl in existing reactors appears attractive as compared with rear face pressurization with the use of water.

DECLASSIFIED

[redacted]

ORGANIZATION AND PERSONNEL

Total on Roll, February 29, 1956	1,433
Net Change	+1
Total on Roll, March 31, 1956	1,434*

* During the month 76 Project Section employees were given notices of temporary lay-off effective March 30, 1956; however, 44 were placed on temporary assignment.

AB Greninger
MANAGER, ENGINEERING

AB Greninger

[redacted]

ENGINEERING ADMINISTRATION SECTION

MARCH 1956

A statistical services opinion survey was conducted during the latter part of February. The purpose of the survey was to evaluate the quality and effectiveness of the statistical services provided to personnel throughout the plant during 1955 from their standpoint. The results of the survey showed that personnel of the Unit did a good job during 1955. Scores for professional caliber of work performed, value of consulting services provided, and competency of personnel were very high, while value of analytical service provided and degree of effective service relationship were good. However, it was evident that the area for greatest improvement lies in providing a more efficient and timely service. This improvement is needed in all departments. These results are consistent with our belief that the Unit is understaffed. This was further indicated by the results that 47 percent of the employees feel that more service should be provided to their department. The results of the survey were also broken down by departments to indicate where the Unit had to direct effort during 1956. The detailed results of the survey were reported in a letter to W. M. Harty, "Statistical Services Opinion Survey," dated March 19, 1956.

A paper entitled "Possible Bias Introduced by the Use of Average Values in Certain Calculations" was prepared by J. L. Jaech. This paper was prepared for presentation at the Atomic Energy Commission Statistical meeting to be held in Washington, D. C., on May 8 and 9, 1956. Participation in this meeting was requested by the SS Accountability Section, Financial Department.

In response to a dual request from personnel of the Dow Chemical Company at Rocky Flats (Dow Chemical has been assigned the responsibility by the AEC of writing new final product specifications and of following problems arising from such specifications) and from personnel of the Separations Technology Section, a meeting at Los Alamos, New Mexico, was attended by J. A. Merrill on March 14. The purpose of the meeting was to discuss a request which had previously been made by Hanford for a relaxation in the specification pertaining to the alloy material content. A discussion was held with Dr. R. K. Zeigler on March 15 concerning the statistical aspects of the various density vs. alloy content relationships observed at different sites as compared with the theoretical relationship. (HW-42250: "Trip Report, Final Product Specification Meeting Held at Los Alamos on March 14, 1956," dated March 27, 1956.")

A report was issued covering the trip made to Oak Ridge by J. A. Merrill during February to attend a special accountability meeting. (HW-41779: "Trip Report - Enriched Uranium Accountability Meeting Held at Oak Ridge on February 6, 1956," dated March 5, 1956.)

Consultations have been held with personnel of the Personnel Practices Section for the purpose of designing and scoping a safety "attitude survey"

[redacted] DECLASSIFIED

utilizing interviewing techniques.

The newly appointed HOO Classification Committee, of which the Head, Technical Information Unit, is a member, held its first meeting on March 20. The meeting was attended by the Manager, HOO. The committee took up (1) A proposed Criteria of Top Secret Classification, and (2) The problems raised by the present AEC requirements regarding declassification of information in Category 1 of the Declassification Guide. The Committee took the following actions: (1) Approved the proposed Criteria of Top Secret Classification, (2) requested the Head, Technical Information Unit, to publicize instructions to HAPO personnel on the declassification requirements of information in Category 1, (3) requested the Head, Technical Information Unit, to prepare a letter to the AEC Office of Classification requesting authority to declassify information in Category 1, pending the completion and approval of the HAPO Classification Guide, and (4) recommended that the HAPO Classification Guide be brought up to date and reflect the latest decisions on classification matters.

C. G. Stevenson, Head, Technical Information Unit, attended the 22nd meeting of the AEC Technical Information Panel, held in Washington, D. C., February 27-29. The meeting principally considered Technical Information problems rising out of the Civilian Application Program.

Time was spent during the month on problems connected with closing out the Yellow File in Schenectady. An inventory list of Yellow File documents was mailed to Schenectady on March 22, 1956, and an inventory of all classified documents will be made before the Yellow File is returned to HAPO.

WM Harty

Manager - Engineering Administration
ENGINEERING DEPARTMENT

WM Harty

DECLASSIFIED

DECLASSIFIED

PILE TECHNOLOGY SECTION

MONTHLY REPORT

March 1956

VISITORS

W. F. Arnold, O. M. Barlow, Wm. Henderson, W. H. Moran, R. A. Nickerson and J. K. Wheater, from UCRL-Livermore, discussed DXT setup and calibration at HAPO, March 13-16.

Ruppert Bledsoe from GE Sales, Seattle, visited HAPO on March 8 to discuss x-ray diffraction equipment.

C. E. Bussert and C. H. Walden from National Lead, Fernald, Ohio, visited HAPO on March 27 regarding fuel element fabrication and fuel element specifications.

R. S. Bybee, C. O. Herralle, D. B. Macfarlane, Jr., W. H. Moran, D. J. O'Connell, M. J. Ryan, D. T. Scalise, G. E. Steers and W. E. Stockton from UCRL, visited HAPO for fabrication consultation on Whitney work, March 19-30.

M. Doumas and R. H. Fillnow from WAPD-Pittsburgh, and C. T. Lohrey from KAPL-Schenectady, visited KAPL for discussions regarding operation of KAPL-120 loop, March 7-9.

K. Downs, J. Hendricks, G. Price and R. Sher, BNL-Upton, N.Y., discussed graphite-uranium, exponential and experimental reactors at HAPO on March 9.

J. A. Fellows, C. M. Henderson, W. J. Petty and H. J. Schaffer from Mallinckrodt Chemical, St. Louis, reviewed metal fabrication problems as affecting reactor behavior, at HAPO, March 13-15.

N. R. Hart from Columbia Geneva Steel, Seattle, visited HAPO on March 13 to discuss structural materials, corrosion and weld testing.

Lt. R. H. Johnson, Wright-Patterson, Air Force Base, Ohio, visited HAPO regarding Army gas loop, March 21-22.

M. D. Martin, D. C. Sewell and K. R. Street, UCRL-Livermore, visited HAPO regarding program planning for Whitney Project, March 26-27.

VISITORS (continued)

F. G. Minuth, ANL-Lemont, Ill. visited HAPO on March 9 to compile data for gamma irradiation facility catalog.

T. R. Neville, Jr., KAPL-Schenectady, visited HAPO regarding KAPL-120 test facility, March 1 through March 31.

G. C. Westfall, KAPL-Schenectady, spent March 29-30 at HAPO regarding irradiations for KAPL-120 loop.

TRIPS

R. J. Anicetti attended uranium oxide meeting at WAPD-Pittsburgh, March 20, and discussed ceramic extrusion problems at GE-Carboloy Dept., Detroit, March 21.

K. J. Bell attended American Society of Mechanical Engineers meeting held at Portland, Oregon, March 19, and delivered a paper.

J. A. Berberet recruited technical personnel at Whitman College and Walla Walla College, Walla Walla, Wash. on March 6. He attended a meeting on production of Cobalt 60 at Savannah River, Augusta, March 25-26, and discussed Army gas loop at AEC-Army Reactors Branch, Washington, D.C., March 27.

S. H. Bush visited ANP-Cincinnati to attend Intra-Company fuel element meeting on March 1, and visited the University of Michigan, Ann Arbor, on March 2 regarding diffusion of radioactive isotopes.

J. J. Cadwell attended spring meeting of the American Society of Mechanical Engineers held in Portland, Oregon, March 19-20.

J. J. Cadwell and O. J. Wick visited UCRL-Livermore, regarding program for FY 1957, March 6-8.

J. L. Carter, Jr. attended meeting of the American Physical Society held in Pittsburgh, and visited MIT-Boston; Harvard University-Boston; KAPL-Schenectady; ORNL-Oak Ridge, and University of Illinois-Urbana, regarding radiation effects in solids, March 12-23.

J. M. Davidson and J. F. Fletcher spent March 19-31 at MTR-Phillips Petroleum, Idaho Falls, for installation of GEH-9 experiment.

DECLASSIFIED

TRIPS (continued)

R. L. Dickeman attended Advisory Committee on Reactor Safeguards meeting at AEC-Washington, D.C., March 1-2.

J. M. Fouts visited duPont-Savannah River Plant, Augusta, March 20-23, to examine I&E slugs and equipment.

M. D. Freshley spent March 2-3 at UCRL-Livermore for fabrication consultation for Whitney.

R. M. Fryar spent March 19-20 in Portland, Oregon as Session Chairman for the Nuclear Engineering Division of the American Society of Mechanical Engineers spring meeting.

N. D. Groves discussed application of titanium and various stainless steel alloy developments at Trent Tube Co., E. Troy, Wis.; Allegheny-Ludlum, Breckinridge, Pa.; duPont at Wilmington, Del.; Merk Company at Raway, N.J. and Carpenter Steel, Union, N.Y., March 5-9. He also attended technical committee meetings for National Association of Corrosion Engineers held in New York City, March 12-16.

L. A. Hartcorn attended Metallography Sub-committee Meeting at Mallinckrodt Chemical, St. Louis, March 13-15.

D. C. Kaulitz and I. D. Thomas discussed fabrication techniques and equipment for fuel elements at Fenn Company, Hartford, Conn., March 1-2.

D. C. Kaulitz discussed fabrication techniques and equipment for fuel elements at Hydropress Company, New York City; Chambersburg Engineering, Harrisburg, Pa. and Sunstrand & Beatty Company, Chicago, March 3-6.

R. K. Koler visited National Lead, Fernald, Ohio, March 5-9, to discuss manufacture of uranium components.

M. Lewis recruited technical personnel at the University of Portland, Portland, Oregon, March 14.

N. R. Miller discussed aluminum and carbon steel corrosion at NRL and Aluminum Task Force Group, Washington, D.C., and Alcoa, New Kensington, Pa., March 20-21.

R. Neidner visited MTR-Phillips Petroleum, Idaho Falls, regarding GEH-4 test loop, March 14.

Roy Nilson delivered colloquiumtalk to Physics Department on subject of PhD thesis at the University of Washington, Seattle, March 19.

TRIPS (continued)

W. J. Ozeroff discussed Nuclear Safety Guide at LASL-Los Alamos, March 1-2, and discussed Project Whitney at UCRL-Livermore, March 5-6.

R. S. Paul recruited technical personnel at University of Oregon, Eugene; Linfield College, McMinnville, and Lewis & Clark, Portland, March 7-9.

O. W. Rathbun observed uranium fabrication at National Lead, Fernald, Ohio, March 1-2.

W. P. Wallace visited Bridgeport Brass, Bridgeport, Conn. on March 26 regarding zirconium process, and visited AEC-Pittsburgh on March 29 regarding zirconium procurement.

C. D. Wilson visited Alcoa, New Kensington, Pa. on March 21 regarding aluminum fabrication, and discussed zirconium fabrication at AEC-Pittsburgh Area Office and Superior Tube, Norristown, Pa., March 22-23.

E. C. Wood recruited technical personnel at San Jose State College, March 19-21; University of California, Berkeley, March 19; University of Santa Clara, March 20, and University of Arizona, Tucson, March 23.

M. R. Wood visited Technical Associates, Jordan Electronics, Hycon Mfg. Co., Technical Development Co., Berkeley Division-Beckman Instruments, Tracerlab Inc., Los Angeles and Richmond, Calif., March 26-31, to determine technical capacity of manufacturers to perform requirements of Req. D-83210-P for Project CA-512R.

F. W. Woodfield and C. D. Wilson discussed zirconium fabrication at Bridgeport Brass, Bridgeport, Conn.; Chase Brass & Superior Tube, New York City; Tube Reducing Corp. and Allegheny Ludlum, Wallington, N.J.; AEC-Pittsburgh Area Office, Pittsburgh, Pa., and National Tube, Gary, Indiana, March 26-30.

R. E. Woodley consulted with UK representatives on in-pile graphite oxidation at AEC-Washington, D.C., March 5-6.

H. A. Paulsen recruited technical personnel at five schools in the Los Angeles area during the week, March 12-16.

P. H. Reinker visited KAPL, Feb. 27-29, regarding KAPL Assistance to Hanford program. On March 1 and 2 he attended the Advisory Committee meeting on Reactor Safeguards at AEC-Washington, D.C.

DECLASSIFIED

DECLASSIFIED

ORGANIZATION & PERSONNEL

Personnel totals:

	February 29	March 31
Administrative	2	2
Pile Engineering	104	101
Pile Materials	68	69
Fuel Technology	123	120
Physics Research	38	39
Metallurgy Research	85	85
Contact Engineering	3	3
Technical Administration	10	10
Totals	433	429

Pile Engineering: R. J. Brebrick, Engineer II, was hired March 29; C. L. Buckner, Technician Trainee, transferred in from Reactor-Manufacturing, March 12; G. H. Hansen, Technician Trainee, transferred in from Fuel Technology, March 12; W. S. Figg, Engineer I, transferred in from Separations Technology, March 1; M. H. Fitch, Secretary B, transferred in from Auxiliary Operations, March 19; L. R. Ferrill, Engineering Assistant, transferred to Reactor-Manufacturing, March 1; J. L. McElroy, Technician Trainee, transferred to Radiological Sciences, March 12; R. R. Lewis, Technician Trainee, transferred to Pile Materials, March 12; H. L. Carlson, Technician Trainee, transferred to Radiological Sciences, March 26; B. L. Harris, General Clerk B, terminated, March 20; M. I. Clark, Secretary C, was deactivated, March 16; J. H. Gerety, Engineer II, was transferred from weekly to monthly, March 1.

Pile Materials: L. M. Harding, Secretary C, transferred in from Engineering Administration, March 5; F. D. Hobbs, Engineering Assistant, transferred in from Separations-Manufacturing, March 12; R. R. Lewis, Technician Trainee, transferred in from Pile Engineering, March 12; R. L. Moore, Technician Trainee, transferred to Separations-Manufacturing, March 12.

Fuel Technology: J. H. Johnson, Engineer II, was hired, March 26; C. L. Bennett and E. R. Gilbert, Technician Trainees, transferred to Radiological Sciences, March 12; G. H. Hansen, Technician Trainee, transferred to Pile Engineering, March 12; H. J. Pierce, Technician Trainee, transferred to Separations-Manufacturing, March 12; P. D. Wright, Engineer II, terminated, March 15.

[redacted]

DECLASSIFIED

DEL

Physics Research: D. A. Kottwitz, Engineer I, was hired, March 15; J. J. Regimbal, Tech Grad (summer employee) was hired, March 20; W. B. Farrand, Engineer I, terminated, March 9.

Metallurgy Research: H. A. Flaherty, Engineering Assistant, was hired, March 7; R. L. Wetherald, Engineering Assistant, transferred to Project Section, March 15; R. H. Todd, Engineer II, was transferred from weekly to monthly, March 1.

[redacted]

PILE ENGINEERING SUB-SECTION

PROCESS TECHNOLOGY

Power Level Limitations

Maximum power levels at the DR and F Piles were limited by the arbitrary 100 C tube outlet temperature and at the C Pile by the arbitrary 98 C limit. The B Pile was generally limited by trip before instability limits near 99 C. The D Pile has been limited by non-equilibrium conditions following shutdown and by control flexibility requirements. The H Pile has been limited by the 105 C tube outlet limit. Maximum power levels at the K Piles were limited by emergency water supply considerations in spite of which new high power levels of 2200 MW were reached at both reactors.

Process Specification Changes

Specification 58.00 - "Reactor Shutdowns" - Requirements for an inter-tie between flux-trip devices (Beckmans) of reactors in dual reactor areas were added to the specification.

Pile Operation

Under the routine tube replacement program the following numbers of tubes were removed: B-56, D-59, and F-65. All were replaced plus six at B, five at D and two at F that were previously empty channels. At the H Pile five tubes were installed in empty channels left from previous tube removal outages.

A total of eight tube leaks occurred during the month plus seven rear Van Stone leaks as compared to sixteen tube leaks and two Van Stone leaks in February. One tube leak occurred at each of D and H Piles, the rest at the F Pile.

At 7:16 A.M. on March 27, 1956, the C Pile was scrammed when the front pigtail of tube 3158 separated from the crossheader. Subsequent investigation showed that the nut which attaches the pigtail to the crossheader was broken. Immediately after the scram a strong reverse flow as seen to be coming from the pigtail. The metal was discharged from the tube with no difficulty and the tube has been removed and replaced. Preliminary visual examination of the metal from the tube revealed that two unfilmed slugs (upstream slugs) had what appeared to be holes in the can wall which could have been caused by melting of the aluminum jacket. Radiometallurgical examination has as yet failed to reveal any penetration of the can wall nor any evidence of melting of the slug jackets. The dark spots which were thought to be holes in the cans are now believed to be foreign matter that became embedded in the softened can wall as the pieces fell into the basin. Calculations based on the assumption that the separation of the pigtail from the crossheader and the loss of water were instantaneous indicate that the most probable temperature reached by the slugs was approximately 700 C and by the tube was about 250 C. It should be recognized that the results of the Heat Transfer calculations are strongly dependent upon an accurate assumption of the exact water flow transient during a crucial few seconds at the time of the scram. A more detailed account of this incident is being issued as HW-42325.

DECLASSIFIED

I & E Slugs

Four columns of I & E slugs are being irradiated at C Pile. In general the irradiation is proceeding satisfactorily. The heat generation in I & E slugs of this particular geometry and canning method has been observed to be about six or seven per cent greater than in normal slugs irradiated under similar conditions.

Anomalous annulus temperature indications suggested the removal and recharging of one I & E slug column. The replaced downstream thermocouple probe was aligned in a vertical plane to measure the effect of the thinner water annulus at the top of the slug train which is caused by the slug eccentricity in the process tube.

Visual observation of film patterns on the discharged pieces indicates that as many as eight of the farthest downstream pieces may have been misaligned in the process tube. The condition is felt to prevail in another charge which displays high annulus temperature on the far side of the charge. Temperatures from the top of the slug train, as measured in the recharged tube, are twenty to thirty per cent above the tube bulk outlet temperatures and are considered to be the true eccentricity effect.

Test of Enriched Cored Slugs

Six charges each containing five lead-dip-canned, cored slugs of uranium enriched to 1.75 per cent U-235 have been irradiated in the C Pile. In two of the charges the cored slugs had an axial void of 3/8 inch diameter closed with uranium end plugs welded in place. In two other charges the test slugs were similar except that aluminum end plugs which were pressed in place were used. In the final two charges, the axial void was of 5/8 inch diameter and the end plugs were also of aluminum. In order to obtain the enriched material it was necessary to reclaim four inch slugs which had previously been triple-dip-canned. During irradiation, the test slugs were located just upstream of the pile center line and were positioned by regular uranium slugs.

Test conditions provided specific powers averaging ninety-five kilowatts per foot. Failures occurred at exposures of about 500 MWD/AT in three of the charges having 3/8 inch core diameters. Two failures occurred in the 3/8 inch cored slugs having aluminum end plugs. No failures occurred in the slugs having 5/8 inch core diameters, although one of the regular slugs in one charge did fail. Discharge exposures of the two charges, one discharged as a result of the regular metal failure, the other after significant test results were achieved, were above 1000 MWD/AT. One charge was exposed to approximately 1200 MWD/AT.

Post-irradiation examination has revealed that the unfailed 3/8 inch cored slugs were split within their jackets. No splitting was detected in the 5/8 inch cored slugs. All slugs displayed evidence that within the core the uranium had been transformed to the beta phase.

Preliminary analysis of the test shows, with 99.95 per cent confidence, that the 5/8 inch core diameter has a significantly improved resistance to failure over the 3/8 inch core diameter. The factor of improvement probably exceeds ten and may be as high as seventy. No significant difference was demonstrated between the two types of 3/8 inch cored slugs.

DECLASSIFIED

While these results are significant, care must be taken in their application. There is sufficient difference in four and eight inch slugs and between triple-dip-canned and rod form, beta heat treated uranium to warrant further testing before direct application. Further, the loss in reactivity and conversion ratio with a 5/8 inch axial void may not permit all the apparent gains to be achieved. Further testing and economic evaluation must be performed as rapidly as possible before a major change in the production fuel element appears justified.

Ruptured Slugs

Thirteen slug ruptures occurred during March, of which one was a "to-rupture" experimental production test.

A total of 173.2 hours of lost operating time was charged to rupture removal which amounted to 3.1 per cent lost time operating efficiency. Sixty-three and five tenths of the lost hours were charged to "to-rupture" production tests.

In regular production irradiation, there were four side-hot spot failures, one side-reduced rib failure, two side failures from other causes, two cap failures, one unclassified, and two splits, one of which was a drilled, cored slug. The "to-rupture" test failed with a side-hot spot.

The month's rupture experience was characterized by:

(1) An overall decrease in ruptures, from 29 regular metal failures in February to 10 in March, presumably as a result of special discharges (roughly 180 tons gross, or 28.5 tons increased throughput) made to prevent failure of rupture prone material.(1)

(2) A reversal of the adverse rupture trend, (which apparently had not reached a steady high level and which resulted from the change to high-goal production) was observed when special discharges were commenced. Special discharging is believed to be the controlling variable. Although it is possible that small power and/or temperature cuts and changing metal quality could have had an effect. A program is now underway to change goal exposures and put high power tubes at several reactors on low goal. This will reduce the rupture proneness of the affected tube.

(3) Greatly decreased incidence of reduced rib failures which was also true in February. This continued decrease presumably also is due to special discharges of metal in tubes with calculated heavy corrosion.

Production Tests

(See following pages.)

(1) HW-41863, "Special Slug Discharges to Prevent Ruptures," J. F. Music.

RUPTURED SLUG TABULATION

Date	Tube No.	Lot No.	Type Metal	Exposure	Type Failure
3/3/56	3381-DR	Z-58	8" Reg., Reprocessed	634	Side - HS
3/7/56	2558-DR	Z-9	8" Reg., Reprocessed	774	Unclassified
3/10/56	1691-DR	K-182	8" Reg.	673	Side - HS
3/12/56	3480-B	D-94	8" Cored	699	Split - Longitudinal
3/13/56	1562-C	V-803	8" Solid (Dingot)	227	Side - Other
3/13/56	1590-H	M-57	8" Reg.	686	Cap
3/13/56	3672-H	Z-43	8" Reg., Reprocessed	668	Cap
3/13/56	1371-DR	K-188	8" Reg.	560	Side - HS
3/17/56	2375-H	Z-42	8" Reg., Reprocessed	736	Split - Longitudinal
3/19/56	3564-F	M-26	8" Reg.	749	Side - RR
3/20/56	2365-H	M-64	8" Reg.	790	Side - HS
3/22/56	2479-DR	NA	8" Reg.	694	Side - Other
Production Test Ruptures					
3/2/56	2179-F	NA	4" Cored (PT 570-A)	2045	Split - Longitudinal

Notes:

Side - RR Failure caused by reduced ribs in tube.
Side - HS Failure caused by a hot spot.
Side - Other Failure apparently was due to some mechanism other than a hot spot or reduced ribs, such as a pin hole penetration or another unknown mechanism.

Split - Longitudinal Split parallel to axis of slug or at some small angle to axis.

Split - Transverse Split perpendicular to axis of slug.

DECLASSIFIED

[redacted]

PRODUCTION TESTS

Test No.	Type Metal	No. of Tubes	Pile	Goal Exposure	Present Exposure	Remarks
105-570-A	Cored-Lead Dip	4	2-C 2-F	2 ruptures 2 ruptures	Discharged	Ruptured at 1115 & 1173 MWD/T 1 ruptured at 1969 other discharged 1939.
	Control	4	2-C 2-F	2 ruptures 2 ruptures	1 discharged at 1046	1 ruptured at 1128 MWD/T Ruptured at 1524 & 1547 MWD/T, Irradiation Complete.
105-586-A	U-Si Ingots	1	B	900	Discharged at 1007 MWD/T	
	U-Si Ingots	4		2 ruptures		Not yet charged
	U-Si Cored	3		900		Not yet charged
	Control	4		2 ruptures		Not yet charged
105-588-A	Development Test of Extruded and Drilled Cored Slugs	2 tubes per mo.	1-C	900		Discharged 1 rupture at 797 MWD/T
			3-C	1100		Discharged at 750 MWD/T
			3-D	900	Discharged at 900	1 ruptured at 772 MWD/T 1 discharged at 788
			5-D	900	Discharged at 900	1 discharged at 807
			3-D	900		Discharged for tube replacement
			12-D	900	390-445	Charged 9/28/55
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.
105-593-A Supp. A	Cored-Al End Plugs	4	C	2 ruptures	775-890	
	Control	4	C	2 ruptures		1 ruptured at 568 MWD/T
105-596-A	Dingot Slugs	9	F	2-300 2-600 5-900	All tubes discharged at goal except rupt.	Slugs charged alternately with control slugs from rod-transformed and slug-transformed metal. One ruptured at 844 MWD/T. Irradiation Complete.

DECLASSIFIED

DEL

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 & 12 normal Matrix slugs.
105-601-A-53-MT	Solid	12	D	6-600 6-900	345-395	Two tubes discharged at 240 MWD/T for tube replacement. Delay of 30, 43, 50 and 80 seconds between salt bath and water quench.
105-607-A-57-MT	Cored Enriched Welded Uranium and Aluminum End Plugs 3/8" and 5/8" Core Diameters	6	C	Ruptures	Discharged at about 1100 for enriched pieces. 5/8" hole size.	Compares performance of welded uranium and aluminum end plugs and a larger core diameter. Ruptures have occurred in one welded uranium end plug slug and two aluminum end plug slug 3/8" hole size at 550-600 MWD/T. Regular metal failed in one 5/8" tube at 596 MWD/T. Irradiation Complete.
105-608-A-56-MT	Dingot Slugs	16	B	7-600 9-900	350-425 350-425	Compares various mechanical and heat treatments of dingot uranium.
105-608-A-56-MT Supp.	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	45 45	Rod heat treated in vertical position.
105-611-A	Reg. Produc.	33	19 B 14 C	500,900,1100 500,800,900	180-340 100-200	Investigates the effects of pile variables upon slug stability. Charged 2/24/56.
105-613-A-54-MT	Solid	20		4-400 8-600 8-900	Not yet loaded	Delays 35, 50 and 80 seconds between salt bath transformation and water quench. Heat treated in rod form.

DECLASSIFIED

DEL

105-614-A-62-MT	Hot Press Canned Solid Slugs	8	C	200,350,500,750 and 2 ruptures	Circulating for Approval	Evaluates hot press canned solid slugs having anodized jackets.
	Control	8	C	200,300,500,750 and 2 ruptures		
105-615-A-63-MT	Lead Dip Canned I & E	8	C	150,300,500 and 2 ruptures	75	Provides basic information on I & E performance and conversion ratio. Four tubes of each type loaded 3/14/56. One I & E charge discharged and replaced at about 50 MWD/T
	Control	8	C	150,300,500	60	
105-620-A-65-MT	Tru-Line		C	Normal Goal	Approved	Provides for the quantity charging of Tru-Line slugs.
105-621-A-67-MT	Anodized	12		600,800, MWD/T	Approved	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.

DECLASSIFIED

DEL

HEAT TRANSFER

Instability Limits

A report presenting experimental pressure-flow data of K process tube geometry at 50, 100, and 200 kw was prepared. For each tube power, tube flow rates were lowered beyond the point at which maximum pressure in boiling exists. The results, which are approximate, indicate the minimum pressure requirement exists at the temperature corresponding to incipient bulk boiling at the rear crossheader pressure. The preparation of the documents concerning the revised instability limits are in their final steps. The five documents being prepared will provide a coverage which will include the philosophy of instability limits, the theory and use of the generalized boiling curves, and the revised limits themselves.

Hydraulic Studies

A preliminary design of an I & E slug for the 1706-KER facility was made. The slug is dip-canned, has a 1.675 inch outside diameter, a 0.735 inch diameter hole, and is expected to give approximately equal outlet water temperatures from hole and annulus.

Glass and metal mockups of the B-D-F rear Parker fitting were designed and construction started. Studies of cavitation and pressurization in the fitting are planned.

Cooling by Boiling Studies

The loop has operated satisfactorily with the exception of the failure of the thrust bearings in the recirculation pumps. An outage of four days was required to replace these bearings. A brief summary of the burnout determinations made thus far is shown in tabular form below. The burnout qualities shown below are approximate and require correction for second order effects.

Run No.	Outlet Tube Pressure psia	Electrical Tube Power kw	Tube Inlet SubCooling °F	Tube Outlet Quality % by Weight	Method of Approach to Burnout
10	600	603	100	51	Decreased Flow
7	1005	611	101	56	Decreased Flow
11	1000	584	122	48	Increased Tube Power
8	1250	606	101	50	Decreased Flow
3*	1525	619	125	38	Decreased Flow
4	1515	606	113	39	Increased Inlet Temperature
5	1515	631	113	43	Increased Tube Power
6	1515	605	108	41	Decreased Flow
9	1745	608	102	41	Decreased Flow

These data tend to indicate an increase in burnout quality up to 1000 psia and a decrease at higher pressures, other things being the same. The agreement between the four different runs at 1500 psia using three different methods of approach to burnout is encouraging. The lack of agreement between the two points at 1000 psia is not. However, the discrepancy between the two points at 1000 psia is not as great as indicated because a small correction yet to be made will move the points closer together.

*Aluminum heater tube. All other tests performed with same tube of copper nickel alloy.

DECLASSIFIED

Shutdown Water Flow Studies

Part I of a K Reactor Flow Transient report was completed in rough draft form. Among the items included in this report are recommendations concerning the high pressure cross-tie valving and flushing, generator operation, and the FB-5 flow balance valve. Because of the crossheader screen plugging that occurred recently when the cross-tie system was inadvertently opened to the KW Reactor, the present requirements of six months flushing periods with both reactors down will be changed to give more frequent flushing while maintaining protection to the operating reactor.

A technical paper dealing with failure of the 165-KW emergency generators on August 21, 1955, was prepared and submitted for presentation at the USA-UK reactor safety conference to be held in June.

Analytical Services

A document was issued giving the expected temperatures of in-pile horizontal control rods after the sudden loss of cooling water. Results are presented for control rods at all of the Hanford reactors.

Special Studies

A review of methods for the calculation of water film heat transfer coefficients has been started. The object of this study is to select or develop a method of calculation that will acceptably predict the water film coefficients between slugs and cooling water in reactor tubes at present or anticipated conditions. The equations tested thus far gave coefficients from fifty to three hundred per cent above those measured in a test run on the high pressure loop at 33 to 90 gpm and 1500 psi outlet water pressure. These discrepancies may be a result of high Reynold's number, which in this run were considerably above the range encountered in present pile operation, and for which the generally used relationships are considered valid. Other data will be reviewed to obtain more information on this effect.

Production Tests - PT 105-615-A-63-MT

For the first part of this test, four tubes at C Pile were charged with I & E slugs. Four adjacent tubes were charged with regular solid slugs as controls. Each I & E tube contained a thermocouple probe immediately downstream from the active section so that individual hole and near and far side annulus stream outlet temperatures could be measured.

Reactor startup occurred on the morning of Thursday, March 15, without incident. As full power level was approached the far side annulus thermocouples began indicating abnormally high temperatures. Special limits and continuous observation were given to these tubes. When the pile went down for a scheduled charge-discharge one of these tubes was discharged for examination. This indicated no slug corrosion, slightly more than normal film buildup, and evidence that some of the slugs were cocked. More complete examination will be required to fully analyze the situation.

DECLASSIFIED
WITH DELETIONS

DEL

This tube was recharged with I & E slugs as before but a different thermocouple probe was installed. The new probe had one couple at the top of the tube where the clearance is least, the other in the channel between the ribs. The former annulus temperature probes were horizontally arranged. Startup was without incident. However, again at higher powers the far side annulus probe on the remaining abnormal I & E tube indicated high temperatures. Also the top annulus thermocouple on the recharged tube was high but not as high as before. Furthermore, the recharged tube top thermocouple reading retained the same relative position to bulk outlet over a wide temperature range, whereas the other high annulus readings had become increasingly worse at higher powers. It is believed that the recharged tube top thermocouple is reading the normal maximum outlet temperature while the other high readings are mainly due to slug cocking or column misalignment.

All tubes are now satisfactorily within limits though special Panellit settings are used on 0977. Preliminary calculations indicate that the heat distribution between hole and annulus is essentially as predicted and that these I & E slugs generate slightly more heat than a corresponding solid slug. More data is needed to verify these indications.

PILE PHYSICS

Analysis of Coefficient Tests - Dependence on Plutonium Buildup

The graphite temperature and exposure weightings for the recent Brookhaven dry pile coefficient test have been completed and yield a smooth curve for weighted temperature change vs. time. The metal temperature data are currently being worked on, and this part should go much faster than did the graphite calculations.

DECLASSIFIED
WITH DELETIONS

Worksheet forms for determining the temperature weightings for the KE coefficient test series have been completed, and analysis of temperature data is now underway. The temperatures must be weighted for local reactivities, local exposures, and local graphite temperatures. This analytical method was developed after it was ascertained that IBM costs would have been much higher than the hand calculator approach and would have taken considerably more time.

HCR Calibrations - PT 105-605-A - And Associated Prediction Problems

Detailed evaluation of the HCR calibrations performed during the February 17 outage at the DR reactor has largely been completed. A supplement to this production test to spot-check the results when no water leaks are suspected has received most of the required approvals and should be run during the next month. Transient data fitting to establish proper xenon constants is also being attempted. A review of earlier calibration and critical loading data is underway in an attempt to substantiate the recent DR calibration observations. Recent outage transients are being calculated in the light of the new calibration values; consistent results have not been obtained as yet.

Hot startup specification recommendations are being revised to distinguish between allowable rates of rod withdrawal with exact inhour values and the conservative rates which must be used because of present uncertainties in rod calibrations. A document will be issued giving the background calculations and assumptions.

Document HW-41488, "Reactivity Trends and Prediction Problems vs. Operating Trends - 1950-1956", has been completed and will be issued shortly. The observed trends essentially show that prediction problems are aggravated in almost direct comparison to power level and that fundamental evaluations of coefficients, rod calibrations, and flattening evaluations are required in order to reverse this trend.

Pile Safety Studies

The variational control calculation of pile safety system strengths is apparently now programmed sufficiently for evaluation runs. It had been hoped that IBM calculations would be completed by this time so that the K Pile startup control capacity experiments could be evaluated by this method prior to their publication. It appears that much of the high-speed potential of the new IBM facilities was sacrificed in the case of this non-routine technical problem in programming and "de-bugging". Observations at Savannah River indicated that a smaller machine under technical administration provided quite satisfactory service.

Two papers were prepared for possible presentation at the joint US-UK reactor hazards meeting at Chicago in June. One paper discusses the safety ramifications of the plutonium buildup effect on moderator coefficients, and the other discusses operational procedure and instrumentation specifications for insuring safety. These papers are currently being submitted for Washington AEC classification approval.

Lattice Test Reactor operations observed during the month in accordance with assigned review responsibilities were found to be consistent with safety specifications.

DECLASSIFIED

Shield Temperature Studies

The high C Pile local biological shield temperatures reported last month have still not been explained. Both C Pile and DR Pile supervision have agreed to remove rear face outlets from thermal shield tubes to permit visual observation of flow and film buildup.

A supplement to PT 105-604-A calling for re-arrangement of the H Pile fringe poison test pattern is being circulated for comment. It is expected to be circulated for authorization signatures during the next month.

Shield Spectrum Studies

A preliminary calculation has been made for a highly idealized case to show the effect of a dip in the iron cross section for 25 Kev neutrons. The calculation indicates that the neutron leakage at this energy is severe; but notwithstanding this cross-section dip there would be a still more severe leakage of lower energy epithermal neutrons. These results substantiate the previous belief that iron alone would not perform sufficient moderation of intermediate and fast neutrons to thermalize them and therby permit their capture. It should be possible to refine the approximate plane-wave calculations somewhat when better iron 25 Kev cross-section data known to exist have been received; if the refined calculations agree with the above contentions, a document will be issued describing the results and a previously considered bulk attenuation measurement through pure iron will be eliminated.

PHYSICS DEVELOPMENT

Gamma Monitor Installation - CG-578 and 579

The gamma spectrometer slug rupture detection units were installed at F Pile, thus completing the replacement of the beta systems for the five older piles. The systems are functioning as designed with two exceptions; (1) the B Pile installation is still affected by inadequate flow regulation due to improper choice of hydraulic components but is improving as the necessary modifications are completed, and (2) some of the photomultiplier-crystal assemblies are showing an appreciable temperature coefficient in gain. The latter behavior requires gain adjustment periodically during startup to maintain constant sensitivity and is being corrected by photomultiplier replacement and the addition of provisions for cooling.

Slug Rupture Detector Development

Slug rupture detection systems for the proposed fuel element test facilities in the K Pile front to rear test holes have been designed and requisitioned. The basic monitor will be a gamma spectrometer unit and the system will also include an economical geiger tube system to obtain sensitivity comparisons.

A delayed neutron detection system has been fabricated and tested preparatory to installation as the primary monitor on the KER pressurized high temperature loops designed for fuel element testing. Provisions are being made on these recirculating loops to study the water activity in these systems and to carry out a program of slug rupture detector development in support of recirculating coolant system design.

Reactor Safety - Nuclear Instrumentation

A prototype sub-critical neutron multiplication detector designed for use in side test hole installations in all Hanford piles is nearing completion and is scheduled to be installed in the D Pile next month. Both the mechanical and electronic components of this recent prototype have been tested in previous 105 pile installations and demonstrated to perform satisfactorily. It has further been demonstrated that the sub-critical monitor, including its low level period trip feature, is essential to operating safety and its proper use would have prevented the several instances of rapid power rise which have occurred in past months as a result of erroneous reactivity predictions and inadequate information at the low level stages of startup as monitored by existing systems. Since the technology is completely developed, considerable test experience has been gained, and detailed designs are available for the most part, it would appear that project action can be carried forward expeditiously.

Modified process tube ionization chambers, including gamma compensation, have been designed and are being fabricated. The first of these chambers, which is a prototype for the octant monitoring system at B, D, and F Piles, is scheduled to be installed in F Pile next month. D. C. amplifiers with a range sufficient to span the full range of ion current attainable from these octant chambers are being developed.

Lattice Neutron Economy

A measurement of the resonance escape probability and conversion ratio for internally and externally cooled slugs (1.37 inch O.D. and 0.49 inch I.D. uranium) in the water filled 8-3/8 inch lattice was performed in the Physical Constants Test Reactor. In this measurement provision was made for repeating the techniques used earlier in the Test Pile, which yielded approximately a five per cent decrease in conversion ratio from the solid 1.34 inch O.D. slug case, and in extending them to include normalization of the neutron distribution in the uranium rather than the water case as was done earlier; in principle either is correct and should yield identical results. Normalization in the water case exactly repeated the earlier Test Pile result while normalization in the uranium gave a result in substantial agreement with calculations, i.e., the conversion ratio in the internally and externally cooled lattice is essentially unchanged from the solid slug case or 0.835 atoms of plutonium produced per atom of U-235 depleted initially in the cold, clean lattice. The reason for the failure of the water case normalization in resonance escape determinations is being investigated and may be associated with flux perturbations resulting from detector positioning devices. The fast effect was constant at 1.028 for both measurements.

The initial, cold, clean conversion ratio for internally and externally cooled slugs was also determined through flux measurements made in C Pile; the data are still undergoing analyses but appear to be in qualitative agreement with the earlier Physical Constants Test Reactor results. Plans are currently being made to repeat these measurements in C Pile with hot graphite.

Calculations of the reactivity and conversion ratio of a Hanford lattice containing standard diameter slugs with a 5/8 inch core show a 150 inhour loss and a three to four per cent decrease in conversion ratio. Measurements to confirm this are currently in progress.

DECLASSIFIED

The initial irradiation of a five rod cluster fuel element was conducted in the Test Pile as part of a program to provide detached experimental information on the behavior of resonance escape probability and fast effect in these high water content fuel assemblies. The components for the study of cored and internally-externally cooled fuel elements ranging to 2.0 inches O.D. are now available. The components for the study of ranging cluster element lattices in the Physical Constants Test Reactor have been designed but are not yet available.

I & E Slug Conversion Ratio Measurement - C Pile

Four internally-externally cooled fuel element columns were charged into C Pile along with four solid standard uranium reference channels. The bulk power generation rates in these eight channels are being accurately monitored and recorded and will be used as a basis for the determination of the hot, dirty conversion efficiency by chemical methods; the controlled chemical dissolution and analyses will be performed by Separations Technology.

Process Assistance

Continuing laboratory experiments have been performed on a capacitance method for measuring the rate at which process water is ejected from a tube following loss of pressure at full power. The equipment is available, calibrated, and the tests are awaiting the availability of the Heat Transfer electrical mockup.

Several alternate methods of indicating the operability of the K Area Beckman system in the absence of an indicated signal are being developed. The basic concept is that of passing an alternating signal from the Beckman through the ionization chamber and the Beckman system and comparing the phase or time relationship between the input and output signals.

Nuclear Safety

The present status of Hanford programs bearing on nuclear safety were discussed with the Advisory Committee on Reactor Safeguards in Washington, D.C. Topics reviewed in considerable detail were safety and central system requirements, reactor safety fuse, and disaster control. The minutes of this meeting are briefly discussed in document HW-42185.

Analog Computer

The specifications for an electronic analog computer to support Hanford programs were prepared with the assistance of the General Engineering Laboratory. The specifications are rather rigorous and are aimed at achieving a high degree of maintenance-free operation and better than one percent computer accuracy in the solution of nearly any problem; this requires that the accuracy of the individual operations range from 0.01 to 0.05 per cent. Industry is believed capable of providing this quality of performance without premium compensation.

Test Pile - Routine Tests

The testing of uranium slugs proceeded routinely. Fifteen lots of Fernald billet eggs yielded TDS values ranging from 15 to 19. Eight Mallinckrodt egg lots yielded TDS values ranging from 12 to 16.

Test Pile - Special Tests

The reactivity loss associated with charging cobalt containing assemblies in the center of K Pile was determined. Six of the assemblies tested would result in an eighteen inhour loss.

It was determined that Johnson's No. 150 drawing wax would cost five inhours per pile when applied at the rate of one gallon per three hundred tubes.

The reactivity loss associated with using compartmentized internally and externally cooled slugs, i.e., about four per cent of the uranium replaced with aluminum wafers, would result in approximately a 140 inhour loss relative to a 105 pile fully loaded with solid I & E slugs.

The program of measuring the reactivity change induced in natural uranium by irradiation to levels approximating 2000 MWD/T have been completed. This program was performed in cooperation with the Pile Physics Unit and the data are undergoing analyses.

MECHANICAL EQUIPMENT DEVELOPMENT

Slug Cocking and Column Bowing

An interim report on cocking and bowing tests performed in a "C" pile process tube was issued as HW-41661.

Further tests have been run to determine the cocking tendencies of slugs charged into a "C" pile process tube under normal flow and header pressure. Slugs were charged with the worst "C" pile distortion conditions five times and with a straight tube two times. In all but one test, which was with a straight tube, severe cocking was observed.

Flexible Connector Tests

Issued document HW-41527, "Evaluation of Titeflex Teflon Braided Hose, Design Test Request No. 55."

Hydraulic Tube Puller

The tube puller is designed to remove process tubes from the rear face when splitting is not required. Tests were conducted in 189-D Building using a mock-up of a rear elevator and process tube channel. These tests indicated the guillotine needs a larger cylinder. Other minor modifications are being made to improve operation of the unit.

Tritium Producing Control Rods

A study is in progress to determine the mechanical feasibility of producing tritium in the control rods of the proposed "J" reactor and modifications to convert the rods in the present piles for tritium production.

DECLASSIFIED

[redacted]

High Pressure - High Temperature Loop

Leakage tests on Zircaloy-2 B, D, F size process tubing were discontinued due to lack of time to complete tests and a doubt that test results could be applied to the larger KER size tubing. A new test section with standard pipe flanges and gaskets has been fabricated. This type joint will be used in "KER" auxiliary piping and therefore require leakage testing under thermal shock conditions.

Flanging Methods for Zirconium Tubing

A successful Van Stone flange was rolled on a "KER" size process tube specimen. The annealing was done in a salt bath for a period of ten minutes.

Sub-Critical Monitor - Mark III

The new design was completed and fabrication is progressing satisfactorily. The unit is to be installed in "A" test hole in D Pile.

Powder Metallurgy 3X Balls

Investigations have indicated an aluminum-iron alloy may be a satisfactory material to use. It is planned to fabricate test samples from both aluminum-iron powders and nickel-iron powders.

Rubber Boot for Gunbarrel Bellows Repair

Four boots were installed at H Pile. These were installed in a much shorter time than would be required for replacing the original bellows since the nozzle and pig-tail did not have to be removed. Special hose clamp tools have been ordered which will expedite installation. Other areas have not been able to pinpoint pile gas leaks with available equipment.

Top Shield Distortion

A study has been completed on the effect of top shield distortion at the old piles. HW-41507 describes the condition of these shields and outlines possible methods of countering the structural effects of masonite burnout.

Disaster Studies

These studies have advanced to the point where specific experiments are being planned to determine the rate of uranium oxide formation and the degree to which it becomes airborne under disaster type situations.

SPECIAL IRRADIATIONS

KAPL-120 Loop

The KAPL-120 loop logged 570 hours of full operation during the month making a total of 1770 hours of pile operating time on the current group of irradiations. Ninety

per cent of this time has been at reference conditions One pile scram was charged to loop operation during the month. This was a result of inadvertent use of instrumentation circuits in trouble-shooting a new piece of apparatus. Positive steps have been taken to eliminate the reoccurrence. The incident was documented in a letter from R. Neidner to P. Scott, dated March 16.

The ion exchange and filter columns were charged with Rohm and Haas XE170 resin during the month. The installation of the hot crud probe sample points is awaiting a shutdown of at least three days. Other required minor modifications were completed during the month.

Visitors from both KAPL and WAPD were here to re-affirm their need for several revisions prior to the proposed May charge. These modifications are being considered at the proper levels. There has been no further official action with regard to the proposed major modifications and feasibility study for the KAPL-120 loop.

A study is in progress to determine the relative neutron flux gains that could be achieved if the present stainless steel in-pile liners of the KAPL-120 loop were replaced all, or in part, by Zircaloy liners (KAPL-122). Hanford test pile irradiations have been completed on seven mock-up assemblies. The experimental data has been forwarded to KAPL for analysis. Preliminary study of the data here indicates only modest gains can be achieved by the modifications.

A study of the radioactive decay of a sample of material obtained from the KAPL-120 water filter is being carried out using the four pi ionization chamber available at 105-KW. This work is being done in an effort to identify the active material.

Army Recirculating Gas Loop

The feasibility study was completed March 15, 1956. In summary, the initial cost of the facility is estimated at $796,000 including $66,000 for removal, $113,000 for contingencies, and $46,000 for escalation. Twenty months from date of authorization of funds to an operating facility are estimated. The time schedule includes some three months for operational testing.

A second report requested by the Hanford Operations Office, which details our estimate of the inpact of the proposed gas loop project upon Hanford's production, design work, and R & D studies, has been drafted and forwarded to Pile Engineering management for comment.

MTR Liaison

The GEH-4 single pass test facility was charged with a lead slug test to determine the gamma heating in the B-3 position at the MTR. Part of the thermocouple leads failed on the third operating day. The test is now awaiting shutdown so that it can be discharged. There is considerable optimism that the data obtained during the three operating days will be sufficient to establish reasonable gamma heating values.

Agreement has been reached upon all the proposed modifications for the single pass test facility in the B block. Procurement and fabrication are now in progress.

Permission was requested to insert two new tests in continuation of the GEH-3 program. These tests deal with:(1) uranium-thorium alloy fuel material and (2) uranium matrix type fuel material. These tests have a low priority.

In-Pile Irradiation Studies

Contacts with representatives of Westinghouse have firmed up some of the test requirements for the proposed UO_2 fuel sample irradiations (WAPD-114A). WAPD has been asked to furnish an alternate program if the requirement of charging four tubes of this material in one pile at the same time cannot be met. It now appears that samples will not be available at Hanford before mid-summer of this year.

The two experimental assemblies for studying the reaction between gases and zirconium specimens (HAPO 105) continue to operate normally at F Pile. Two additional assemblies have been constructed and will be charged when empty inner tubes are available. The side hole channel (X test hole, H Pile) was borescoped on March 21 to determine the reason for failure to discharge one zirconium graphite sample (HAPO 105) in February. There is no damage in the graphite channel, however, the sample holders appear to be wedged in the channel. An effort will be made to straighten the samples and discharge one during the next H Pile shutdown.

Four I & E thermocouple probes and their accompanying fuel pieces were charged into C Pile on March 14 (HAPO 159). The annular water temperature measured by the thermocouple probe for tubes 0777 and 0876 agreed with the calculated temperatures. The annular water temperature of the other two tubes (0977 and 0878) disagreed with predicted temperatures by a significant amount. Because the annular water temperature of tube 0878 was considerably higher than predicted, the tube was discharged on March 22. On March 23 this tube was recharged with I & E slugs and a temperature probe arranged to measure the water temperature at the top of the tube and between the ribs.

All equipment leads and experimental assemblies associated with the NAA safety fuse experiment (HAPO 162) are ready for charging. The present schedule is to install the experimental leads during the first available outage at DR Pile and to install the experiment at the subsequent outage. It is intended that NAA representatives will be here for the start up following installation of the experimental assemblies.

Specimens for studying the effect of radiation on U-Ni-Al and U-Ni-Fe bonds were irradiated in H, C, and KW Piles during the month. Only two tubes of this material remain to be irradiated under HAPO-165.

A new type of packing for protecting the krypton samples being irradiated in DR Pile to determine the diffusion rate of krypton in uranium (HAPO 166) has been perfected. The routine irradiation of these samples will be resumed shortly.

Four samples (two sets) were irradiated during the month in support of studies directed at determining the amounts and kinds of radioactive materials in pile effluent water (HAPO 172).

DECLASSIFIED

DEL

A study of the effect of pile irradiations on the calibration of thermocouples has been reactivated (HAPO169). A report covering a literature search on this subject is in rough draft form. An apparatus for checking the in-pile calibration of thermocouples has been tested and is ready for insertion in the pile.

A study of thermal neutron flux, resonance neutron flux, and gamma heating is to be undertaken shortly in a K Pile snout facility. Fabrication work is progressing on the in-pile assemblies and a development test authorizing the study has been approved. The auxiliary equipment required for charge-discharge of the K snouts has been received and will be ready for service shortly.

An experiment designed to determine the effects upon uranium metallurgy resulting from low temperature pile exposure has been active for two years (HAPO 108 and 145). These tests were originally designed to utilize a poison column control facility at B Pile. The combination of stringent test conditions and operating difficulties has made this experiment only partially successful. In an effort to improve this condition, another development test has been drafted authorizing the use of a K snout facility for this investigation.

Fifty-four samples of uranium have been irradiated to determine the effects of pile irradiations upon the mechanical and physical properties of uranium (HAPO 154). Twenty-one samples continue under irradiation in D Pile.

In-pile experiments to investigate the possibilities of using nitrogen as pile atmosphere (HAPO 140) continue to be irradiated at H Pile. Samples of the gas atmosphere flowing over the in-pile assemblies were obtained during the month. The analytical results were as predicted.

One sample of a 63 S aluminum sheathed B_4C poison spline is undergoing irradiation in the "quicky" facility. This is a further study of the shielding required for operational use of the poison spline (HAPO 155).

Gamma Irradiation Studies

A total of 128 samples were charged and 156 samples discharged for various customers during the month. This gamma irradiation work being accomplished in the 105-F storage basin and is primarily directed at determining the effect of gamma rays on rubbers and plastics.

The "Somastic" pipe being studied for gamma radiation effects has now received a total dose of 10^9 r. This pipe is proposed for use in handling waste materials underground in the Separations plant. Resistance measurements indicate no measurable insulation breakdown of the asphalt coating.

A production test is being circulated for approval which will authorize the irradiation of a modest amount of cobalt to be used for sources (replacing normal uranium) in the gamma irradiation facilities at F Pile (HAPO 167). This is a preliminary type test to determine the feasibility of irradiating sufficient cobalt to fuel all the presently required gamma facilities without undue interference with pile operation or production.

The use of a chamber centering device in connection with determining dosimetries in the gamma pit was instigated during the month. Using the "Super TP" reproducibility of readings in various sample locations has been considerably improved. The "Super TP" was roughly calibrated against a Victorene Roentgen Rate meter. The Victorene was reportedly accurate to five per cent. On the basis of one test, the "Super TP" is 25 per cent high.

Work continues on procurement of material to construct a high intensity gamma facility. Fabrication of the special cobalt slugs is expected to start momentarily.

Suitable agreements have been reached between the Air Force, the Hanford Operations Office and General Electric Company to permit the initiation of a large program directed towards investigating the effect of gamma rays upon jet fuels, lubricating oils, and greases. The irradiation work only will be done by HAPO and the samples will be returned to Air Force materials contractors for analysis. The magnitude of the program will require the construction of new facilities which for the present will be fueled with irradiated natural uranium slugs. Procurement of material to construct the facilities will begin immediately.

Facilities

Two front to rear test holes were refitted with heavy walled inner tubes at the K Piles during the month. This completes the refitting at KE Pile. At KW Pile one old type tube is yet to be removed and three heavy walled tubes are to be installed. A heavy wall tube has also been prepared for installation in the side hole mockup at the 189-D Building. This is in preparation for flow testing of proposed fuel element assemblies soon to be installed in the K Pile front to rear test holes.

Design specifications, purchase requisition, and appropriation request have all been completed to permit the procurement of a modified gatling gun to complement the magazine facilities at KW Pile. The total cost of this apparatus including installation is estimated at $1700.

The gadgetry necessary to shake down the optical traversing equipment associated with the K Piles has been obtained. Proving of the procedure and training has been started using the graphite mock-up in the 189-D Building.

The project proposal authorizing the modification of the No. 2 Storage Room, 105-KW, to provide adequate facilities for laboratory and shop work in support of the Special Irradiations Unit activities is going through Engineering management for final approval.

Borescoping and Traversing

Vertical height measurements were accomplished on three tubes at B Pile during the month. These channels had all been retubed during the previous outage. Following is a brief summary of the data obtained:

DECLASSIFIED

Tube	Area	Date	Remarks
4574	100-B	3/9/56	Increased .10" at 9' 8" since 6/8/55. Decreased .08" at 22' since 6/8/55.
4454	100-B	3/9/56	Increased .08" at 10' 8" since 6/8/55. Decreased .05" at 22' since 6/8/55.
4391	100-B	3/9/56	Increased .12" at 10' 4" since 6/8/55. Decreased .02" at 20' since 6/8/55.

Charge-Discharge Activities

Eight magazine type samples were charged and 13 were discharged during the month. Seven samples were charged into the "quicky" facility (E test hole at F Pile) and four samples were discharged. One sample boat (graphite) was recovered from the Y test hole at C Pile.

PILE MATERIALS SUB-SECTION

GRAPHITE AND MATERIALS DEVELOPMENT

Plastic Materials Studies

Gamma irradiation of twenty-five miscellaneous thermocouple wire insulations have been carried out to 4×10^7 R at 100 to 110 C. Preliminary results indicate that silicone insulations are superior to the currently used combinations of nylon and polyethylene. Irradiation of these materials will continue to longer exposure.

Low temperature irradiation is also being carried out on tensile specimens of various elastomers and plastics. In these tests teflon has been found to disintegrate at 10^8 R, the polyethylenes are becoming slightly discolored and embrittled, and the silicones are becoming slightly embrittled and showing reduced tear strength. The neoprene rubbers have not changed their properties appreciably. These results are in general agreement with previously published data. They serve as a base point for high temperature tests which are being carried out. Heat aging tests at 150 C in the absence of radiation have shown the neoprene to embrittle rapidly, while silicones and Kel-F elastomers are retaining their properties.

Water immersion tests at 100 C and 150 C are also being performed. Several silicones, neoprenes, and nitrile rubbers (Buna N type) look promising at 100 C for 1000 hours. The silicones and nitrile rubbers are retaining their properties after 168 hours at 150 C. The purpose of these tests is to screen those materials which should be taken to higher temperatures and longer test periods.

Graphite-Steam Reaction

The bombardment of heated graphite samples with steam is being carried out to determine the effect on graphite of a leak in a process tube. The first results with a 300 C sample being blasted by 300 C steam for three minutes showed no erosion of the graphite sample. Additional measurements will be made at successively higher temperatures.

Test Hole Flux Distribution

Flux variations within the 2B test hole in KW Pile have been measured. Through-type water cooled magazines are used in these facilities at both K Piles for the irradiation of graphite samples. They consist of six sample tubes arranged radially around a central one. Eighty-four transverse WSF graphite samples were irradiated in this pattern so that the flux variation could be determined along the length of the test hole and also among the seven tubes at a specified location along the length. The physical distortion of the samples was used as an indication of the total flux received. It was found that a slightly different flux geometry exists in these assemblies than in previous ones used in the older piles. The flux was found to be:

(1) Uniform within ten per cent along the length between tube columns 54 and 86.

DECLASSIFIED

(2) Uniform within eight per cent among the six radial tubes.

(3) Different by 20 per cent between the radial tubes and the center tube.

The large variation between the center and radial tubes may be explained by the additional 1/2 inch of water moderation around the center tube. As a result the center tube will not be scheduled for standard irradiations.

Physical Properties Measurements

In addition to the routine properties measurements on graphite samples, a large number of experimental graphites produced at Battelle Memorial Institute were measured before and after irradiation. Twenty-four such samples were analyzed for X-ray parameters; thermal conductivity was measured on forty Battelle samples and machinability was determined for seven Chemico sludge coke samples. All of these samples were well above machinability limits with the average index being comparable to that of CSF graphite.

Irradiation Annealing

Pulse annealing data obtained by a group at North American Aviation on graphite samples exposed at Hanford for 651 MD/CT at 30 C followed by several pile anneals have been re-analyzed at Hanford by the Vand method. The calculations give the distribution of activation energies for annealing thermal conductivity damage in the various samples. These results make it clear that irradiation and thermal annealing effects are separate phenomena.

It has been suggested previously that irradiation annealing is equivalent to thermal annealing at a somewhat higher temperature. The results of the above calculations show that the damage distribution following irradiation annealing is entirely different from that following thermal annealing. Equating irradiation and thermal annealing in the manner suggested could lead to erroneous conclusions. Further comparisons of irradiation and thermal annealing may be found in HW-40795, "An Experimental Study of Irradiation Annealing of Graphite," by R. E. Nightingale, now being published.

Pile Disaster Poisoning System

Studies were continued on the possibility of impregnating pile graphite with boron graphite compounds by passing BF_3 gas over graphite samples at high temperature. Preliminary results showed by spectrographic means that boron was retained on the graphite. For better accuracy the 305 Test Pile is being used for measuring the quantity of boron deposits on large graphite bars after flowing BF_3 gas around the bars at temperatures from 600 to 1100 C. The large scale equipment which is located in the 189-D Building will allow closer duplication of possible pile conditions.

PILE GRAPHITE STUDIES

Revisions to Process Specifications

Process Specifications 31.00 and 41.00 pertaining to gas composition and graphite temperature have been thoroughly revised and are now being circulated by the Process

Technology Unit for approval. The new specifications are based on a review of all in-pile graphite oxidation data including results from the recently completed Production Test 105-548-E, and other tests (Production Tests 504, 514, 532, 536, etc.). These data indicate that operating temperatures are entering the range where the thermally-induced chemical reaction between graphite and carbon dioxide becomes important. Consequently, the temperature limit with a carbon dioxide atmosphere has not been raised, but a range of maximum temperature vs. helium content has been specified to approximate a constant oxidation rate with any gas mixture. This permits much higher graphite temperature than previously, at high helium concentrations. The new specifications will accommodate post CG-558 power levels at B, D, F, DR and H reactors, and reflect the largest single increase in graphite limits that has been made. Major changes in the specifications are:

(1) Specification 41.00 permits temperatures from 490 C with 100 per cent CO_2 to 650 C with 100 per cent helium (700 C next to enrichment columns).

(2) Specification 41.00 permits exceeding the temperature limits for short periods of time when necessary. It better defines the courses of action to be taken during heat cycles and should assist operation in such cases.

(3) Specification 31.00 now pertains only to CO_2 and helium, and allows a broader temperature range at any given mixture.

(4) The portions of specification 31.00 pertaining to oxygen and water vapor are now included as specifications 33.00 and 34.00 for simplicity and clarity. The content of these specifications has not been changed.

(5) The bases for specifications 31.00 and 41.00 have been completely revised in keeping with the new specifications.

H Pile - Graphite Distortion

During the special outage at H Pile on March 9 and 10, bore diameter measurements and borescope observations were made to determine the extent of graphite radiation damage and its contribution to the tube replacement difficulties. Results indicate that there is no evidence of graphite radiation damage at H Pile which is unique or more serious than at other HAPO piles.

Bore diameter measurements of channels 1686-H and 3290-H were made on the March 9 outage before the channels were broached. The vertical diameter of 1686-H and the horizontal diameter of 3290-H were larger than the process tube diameter. The vertical diameter of channel 3290-H was approximately 3 mils smaller than the tube diameter near the 23 foot trunnion block. The 31 foot trunnion block of channel 1686-H was the same diameter in the horizontal direction as the O.D. of the process tube. Further details are contained in HW-42179, Confidential - Undocumented. During the special shutdown for tool evaluation on March 26 at H Pile, five process tubes were successfully installed with little difficulty.

High Temperature Thermal Conductivity

Calibration of a high temperature thermal conductivity apparatus proceeded during the month. The data in the temperature range 150 - 185 C is within two per cent

of the values reported by the National Bureau of Standards for type 430 stainless steel. The apparatus utilizes a comparative method of steady state heat flow through 0.426 x 1 inch samples. Guard heaters insure linear heat flow through two calibrated standards and the sample of unknown conductivity. Calibration of the apparatus to 600 C is planned.

Gas Analysis Equipment

A comparison test of a modified Beckman oxygen analyzer and a galvanic cell for continuously measuring oxygen concentration in pile gas will be conducted during April at 105-C. The installation of the instruments is 85 per cent completed. After a three-day trial run on tank CO_2, the instruments will be transferred to the pile gas system.

Discussions with U.K. Representatives on Graphite Oxidation

Discussions with United Kingdom representatives on the oxidation of graphite were held on March 5 and 6, in Washington, D. C. Because the use of carbon dioxide in the Calder Hall reactors will be a new experience for the British, they are concerned about the reaction of graphite with carbon dioxide at high neutron fluxes and with the decomposition of carbon monoxide to form solid products, i.e., their primary concern is mass transfer. Hanford experimental data on these reactions were related and in turn, the British presented experimental data obtained at low neutron fluxes in the BEPO pile. A joint report containing complete details of the discussions will be issued in the near future.

Thermocouple Stability

The original objective of this work was to determine the reliability of chromel-alumel as a temperature monitor in systems involving carbon dioxide at temperatures of about 1000 C. Previously reported results indicated that the calibration of bare thermocouples exposed to helium, air, and carbon dioxide remained essentially unchanged, increased slightly, and decreased to the point of failure respectively. It was felt that if some type of protection was afforded the bare wire, in the case of CO_2 atmosphere, the calibration of the thermocouple would remain unchanged. It was proposed that sheath duplex thermocuples would be so protected. In conjunction with five auxiliary 26 gauge C/A thermocouples, three sheath couples have been tested. The three sheath couples and one bare couple were exposed to CO_2 flowing at a rate of 50 cc/minute. One bare couple was exposed to air. The emf's from these couples were compared to a primary and secondary standard. The sheath of one couple was deliberately penetrated - called a leaker. The results are tabulated below.

DECLASSIFIED

Accum. Time 5 TC's Hr:min	Accum. Time TC 46 Hr:min	Accum. Time TC 45 HR:min	Millivolts Deviation from TC 45 (intermittent CO_2) TC46 Twice Air	TC39 Bare CO_2	TC40 Leaker CO_2	TC41 Non-Leaker CO_2	TC42 Non-Leaker CO_2	TC44 Cont. Air
2:51	2:51	2:51	-0.007	-0.028	-0.259	-0.238	-0.218	+0.001
5:15	2:51	3:23	----	-0.290	-0.458	-0.310	-0.211	+0.014
23:06	2:51	4:17	----	-0.406	-1.560	-0.962	-0.183	+0.068
47:00	2:51	5:50	----	-0.433	-2.998	-1.804	-0.149	+0.134
100:37	2:51	6:21	----	-0.531	-5.620	-4.033	-0.103	+0.239
191:57	2:51	7:16	----	-0.751	-8.430	-6.932	-0.058	+0.353
385:53	4:05	10:29	-0.084	-1.045*	-10.277	-9.736	-5.447	+0.494

*Very slow insensitive response. Difficult to balance potentiometer precisely.

In summary, though the data are very limited, the performance of TC42 (sheathed, "non-leaker", CO_2) was encouraging. It demonstrated that a thermocouple can be expected to exhibit exemplary stability when protected by a hermetic sheath. The problem seems to be one of selecting a material for the sheath that is resistant to the chemical attack of CO_2 at elevated temperatures. Tests are planned employing stainless steel sheathed couples.

PILE COOLANT STUDIES

Production Tests

Corrosion data from PT 105-544-E at F Pile will begin to become available within two months at approximately 600 MWD/T exposure. Effluent activity data are now being obtained from each side of F Pile by Radiological Sciences Department.

Reactor Cooling Water Treatment Specification 4.00 (pH adjustment) was relaxed for 100-H Area effective March 7, 1956, for an initial period of 30 days to permit adjustment of 100-H process water pH in the range 6.9 to 7.2. The purpose of this relaxation is to reduce the rate of uniform corrosion attack on process tubes in H Reactor to help extend the operating life of the present process tubes. This extended tube life may be needed for several months until the tube replacement program can be brought up-to-date at H Reactor. This relaxation will be continued in 30-day increments, as needed, until a decision can be made on the use of pH 7.0 water as the coolant for all Hanford reactors. This decision may be made within approximately two months. Effluent activity data obtained from 100-H, 100-F, 100-D, and 100-DR Reactors (D and DR Reactors are cooled with pH 7.3 process water) during the next two to four months by Radiological Sciences Department will be important in the evaluation of pH 7.0 water for process use in all 100 Areas.

One water treatment system at 183-H, consisting of three flocculators, one sedimentation basin, and two filters, was operated from January 26, 1956, to February 20, 1956, under Development Test 105-561-E to demonstrate the satisfactory performance of the synthetic coagulant Separan 2610 in improving settling and filtration rates in the Hanford water treatment plants. Results from this test show Separan 2610 to be particularly effective as a filtration aid when added to the sedimentation basin outlet or the filter gullet inlet in concentrations from 0.005 to 0.020 ppm.

Comparable results using activated silica require from 1 to 4 ppm. activated silica. However, the filter run time was reduced by as much as 20 per cent when Separan was used as the coagulant aid.

Discharge of the metal from tube 3586-D is scheduled for the next extended outage at D Pile. Exposure of the present charge is approximately 600 MWD/T. The tube, operating under PT 105-555-E, will be recharged with weighed regular metal.

Process Specification Change

Reactor Cooling Water Treatment Specification 4.00 (pH adjustment) has been changed, effective March 13, 1956, to permit pH adjustment in the range 7.2 to 7.4 with filter alum until December 1, 1956, or until acid addition equipment becomes operable, whichever is earlier. This change is necessary because permanent acid addition facilities will not be available in all areas until about December 1, 1956.

Pile Process Tubes

Twenty-eight process tubes were examined during the month. No unusual type of corrosion attack was observed.

The program to check the residual wall thickness of process tubes being removed on the Tube Replacement Program was continued. Fifty-nine tubes at B, D, and F Reactors were checked with the Probolog. Checking all of the tubes scheduled for replacement is being considered as a means of eliminating the unnecessary replacement of some tubes resulting from inadequacies of the method of calculating residual tube wall thicknesses.

All of the first IBM run of tube corrosion data from B, D, F, and H Reactors, for the purpose of determining corrosion rates, should be completed within a week. D Reactor has already been completed, and it appears as though the corrosion rate equations can be substantially improved. The calculation of residual tube wall thicknesses for the six oldest reactors, the next phase of this problem, should be completed before the end of April.

A slug with a conical projection one inch long, 5/8 inch root diameter and 1/4 inch tip diameter has been found to be the best water mixing slug tested. This slug has been found to give a mixing efficiency of approximately 75 per cent. Compressive loads up to 12,000 pounds did not result in sufficient deformation of either the water mixing slug or the adjacent slug to cause sticking in a process tube. No unusual cocking tendencies were observed during tests in a "C annulus" glass tube. Two hundred water mixing slugs are being fabricated by Fuel Technology Sub-Section for in-pile testing under a development test.

During the month the fabrication of six ribless zirconium tubes was completed by tube reducing to finished size at Superior Tube Company. Preliminary examination showed that five sound tubes were fabricated from the six starting tube blanks. One tube failed in the tube reducing operation due to excessive cold reduction. Two short sections of tubing (approximately 12 and 21 feet long) were also fabricated from short starting blanks.

DECLASSIFIED

DEL

Discussions with a number of tubing vendors during the month revealed that a majority of the vendors contacted are very interested in developing fabrication techniques for ribbed zirconium tubing. It is expected that within the next two months one or more contracts will be let to accelerate the zirconium tube fabrication program.

Laboratory Corrosion Studies

The results of the test of the effects of heat transfer on aluminum corrosion rates have been analyzed. It does not appear that heat transfer alone can account for the large difference between in-pile and out-of-pile corrosion rates. As an estimate it appears that the heat transfer and radiation effects are about equal in magnitude.

After 20 days exposure to pH 7.3, 2 ppm. dichromate process water at 125 C, the eight inch slugs in 2-S aluminum jackets with six welded-on projections exhibited a uniform corrosion rate of 0.15 mil/mo. compared to 0.65 mil/mo. for the four inch aluminum dummy control pieces. No evidence of localized corrosion attack was observed on the projection slugs.

An electrolytic A.C. slug cleaner was set up to remove the film and corrosion product from slugs and coupons exposed to high temperature process water. Aluminum Minislugs which had been partially cleaned in hot oxalic acid were cleaned essentially free of film after 30 seconds in the electrolytic cleaner. Electrolytic cleaning alone did not completely remove the film, even after 15 minutes in the cleaner, indicating that this cleaner will probably be most useful in conjunction with hot oxalic acid cleaning.

Preliminary flow laboratory hand charging of projection slugs has shown that it is possible to charge the slugs into ribless tubes. These preliminary investigations have also shown that small rails (1/2 to 3/4 inches long) on the slugs would be more desirable from a charging standpoint that 1/4 inch round stud projections. Efforts are now being made to modify a charging machine head to accommodate projection slugs. This charging machine head will be used for further flow laboratory charging studies.

Water Treatment Studies

Process tube 4557-KE which is running with 0.1 ppm. Separan 2610 has accumulated about 35 days of operation. During this time there has been no significant difference in the film build-up between the tube containing the Separan water and the control tube, 4863-KE. Measurements indicate that the effluent activity is unaffected by Separan in the process water.

After 23 days of operation, the 2-S aluminum Minislugs exposed to 125 C, pH 7.3, 2 ppm. dichromate process water containing 0.3 ppm. Separan show a corrosion rate of 0.53 mil/mo. compared to 0.65 mil/mo. for Minislugs exposed to the same conditions without the Separan addition. The slugs exposed to the Separan water were less heavily filmed, which was probably due to the lower corrosion rate.

Document HW-41774, Production Test 105-563-E, Evaluation of Synthetic Coagulant Aid", is circulating for approval. Installation of equipment required in 183-DR for this half-pile test is contingent upon manpower availability between reactor outages.

[redacted]

DEL

RECIRCULATION TECHNOLOGY

H-Loop Recirculation Studies

The first in-pile corrosion data on fuel elements jacketed with one per cent Ni-Al alloy were obtained from the H-Loop. Corrosion rates of the new alloy appear to be about the same as those observed for 2-S aluminum, in high-purity pH 6 water at 200 C. The primary advantage of the nickel addition; however, may be to decrease the susceptibility of aluminum to intergranular attack resulting from hot spots associated with slug warping or other misalignment.

A new charge of similar metal was inserted in the loop and a test at pH 5 was initiated. A total of 20 days operation at 145 C has been obtained. Several operating difficulties have been experienced resulting from system leakage.

Comparison of corrosion rates for both 2-S aluminum and one per cent Ni-Al alloy obtained from H-Loop show these to be as much as 10 to 100 fold higher than supposedly comparable values reported previously. An analysis is underway to determine the cause of these differences. It appears that the difference between fuel element and dummy slug corrosion in H-Loop is accounted for by the temperature drop across the corrosion product film. To date, no satisfactory explanation is available as to the difference between dummy slugs exposed in H-Loop and those tested and reported elsewhere. Future tests in H-Loop are programmed to help explain the apparent differences.

ELMO Loop Development Activities

Quantitative carbon steel corrosion data have been obtained at temperatures of 150 C and 200 C. The numbers show increased corrosion with increased velocity and temperature, and decreasing pH. At 200 C, pH 5.5 and 20 ft/sec. velocity the magnitude of the corrosion rate (approximately 0.7 mil/month) is sufficiently high to rule out carbon steel for the loop piping due to the large cleanup cycle which would be required to remove the corrosion products from the water. At 260 hours, there appeared to be no decrease in the rate with time. Current development work in ELMO-2 and 5 is aimed at testing water in the pH range 6-7.

Four simulated rupture tests were conducted in the ELMO-4 loop, using unbonded, zirconium jacketed slugs. A "pin-hole" (0.025 inch diameter) was drilled through the zirconium jackets prior to exposure. These pieces were observed to rupture at a five-fold higher rate than aluminum clad unbonded slugs. Also, the severity of the zirconium-clad ruptures was greater than in previous tests. Analysis of the rupture data indicates that severity and rate of ruptures is closely related to the degree of "bondedness" - the higher the integrity of the bond, the slower and less severe is the rupture in these out-of-pile tests.

ELMO-5 has run continuously during the month except for three shutdowns to discharge samples. Operating conditions for the test are temperature 200 C and pH 5.4 - 5.6. Considerable time has been spent on developing procedures and good operating practices for the crud probe, sample bomb, and sampling system.

DECLASSIFIED

KER Activities

Construction of the KER Recirculation Test Facility is estimated to be 80 per cent complete. Vendor fabrication of the ribless Zircaloy-2 KER process tubes continues on schedule. Also, procurement of stainless tubes and special KER spacer pieces is on schedule.

Planning of the individual tube charges for KER was initiated. Several types of information are required in order to establish specific loading patterns and operating conditions. These include physics data, hydraulic characteristics, heat transfer calculations, and chattering effects. The required information is under development by means of ELMO loop tests and through cooperation with other Pile Technology components.

Operation of 1706-KE Semi-Works

Operation of the 1706-KE in-pile facilities proceeded satisfactorily. Rapid film build-up occurred in one of the in-pile tubes; however, this trend was detected and corrected by purging in time to prevent a reactor scram. Instrumentation modifications are being installed in 1706 to provide audible alarms in the event trip settings are approached. Previous difficulties associated with control of chemical feed rates have been corrected.

A full flow test was conducted on both the duplex and mixed bed ion exchangers. The test established operating procedures, regeneration time, cycle time, and total throughput capacity. This system supplies high purity water to the various ELMO loops and the Single Pass Boiling facility.

FUEL TECHNOLOGY SUB-SECTION

PROCESS TECHNOLOGY

Hydrogen in Uranium

FMPC is maintaining the hydroxyl content of the beta heat treating salt bath below 1.0 percent by continuous additions of carbon dioxide. Slugs machined from the rods beta heat treated in the low hydroxyl content bath continue to have economic canning yields. A rapid hydrogen analytical unit has been assembled by the Laboratory Analysis Unit of the Manufacturing Department and data are being obtained on slugs with wide difference in hydrogen contents. Results of statistical analyses of these data will be the basis for a hydrogen specification for HAPO production metal.

Uranium Reactivity

The trend of decreased reactivity in Mallinckrodt produced metal has been arrested. TDS tests on six stringers of eight eggs of Mallinckrodt production ingot eggs made in March have an average value of 14 as compared to 17.2 average for stringers tested in January and February. Sample eggs will be tested for isotopic content to determine the cause of the reactivity variation. If the isotopic contents prove to be normal then special analyses will be made for rare earth contents.

Ultrasonic Bond Test

Five new ultrasonic bond test instruments have been checked out and four placed in use (two in operation, two as spares) in the 313 Building manufacturing lines. The new units produce somewhat higher rejection rates (~4%) than the prototype. Rejection rates are running from eight to ten percent, but limited destructive testing indicates only a few are false rejections. This higher rejection rate appears to result from the greater sensitivity to voids in the braze layer of the new units. All slugs rejected by the ultrasonic test units are being recovered. This equipment replaces the frost test.

Construction of special counters for the bond testing equipment is fifty percent complete. These counters will segregate slugs into groups on the basis of total unbonded area.

Ultrasonic Transformation Test

The ultrasonic test level used to insure rejection of all incompletely transformed solid slugs is being adapted for use in the ultrasonic testing of cored slugs as verification of complete beta transformation in the parent rod. Sample slugs obtained from solid production pieces are being drilled for use as standards in the cored slug tester.

25 Mil Standard for Penetration Test

The selection and testing of a lead dip canned fuel element for re-standardizing the penetration test unit have been made. This fuel element will be used to calibrate the test unit at 25 mils, thus increasing the residual can wall thickness. Two lead dip canned fuel elements having oscilloscope patterns approximating that of the "standard" were etch penetrated and found to have residual can walls of 25.3 mils.

DECLASSIFIED

DECLASSIFIED

Nitric Acid in Plating Bath

Nitric acid is being carried from the pre-plating preparation steps to the plating bath in spite of normal precautions. When the concentration of nitric acid reaches 2.5 X 10^{-3}M or above, the effect on the covering power is so extensive that the bath must be purified or discarded. Attempts to control nitric acid contamination in the nickel plating bath have proved unsuccessful to date.

Defective Can Rejects

On March 6, 18.3 percent of fuel element production was rejected at penetration etch for surface voids and laps on the aluminum can wall near the base. A "hold" was placed on the can lot involved and an investigation made to ascertain the seriousness of this condition. Metallurgical examination of samples taken from the defective cans indicated that the flaws were a surface condition not more than a few thousands of an inch deep and would not accelerate corrosive attack. The can lot was released for production. Canned assemblies having gross residual surface defects will be rejected at penetration etch and final inspection as marred surface rejects. This condition was reportedly caused by a rough as-sawed surface on the bottom of some blanks that was not removed prior to extrusion.

Evaluation of Aluminum Components

Hunter-Douglas cans assembled with Alcoa caps and Z lot (recanned) slug cores were lead dip canned with satisfactory yield. Control tubes are being prepared for in-pile corrosion testing of these cans under the provisions of PT 105-66-MT. Fifty Alcoa integral tube I&E cans for vacuum canning have been received and are being evaluated. Surface inclusion frequency was 20 percent for these cans compared with 8.7 percent maximum found in production cans over a one year period.

Specification Changes

The specified chemical composition limits for uranium slug cores (HW-30263) have been revised to increase the maximum allowable chromium content from 30 ppm to 65 ppm and to decrease the maximum silicon content from 100 ppm to 75 ppm. These changes were desirable inasmuch as FMPC is having difficulty with chromium corrosion product contamination in the recycled portion of their production. The corrosion product contamination causes production of uranium frequently containing chromium in amounts up to 55 ppm. The maximum allowable silicon content was reduced to decrease the possibility of forming a ternary (U-Si-Cr) system. This ternary system might result in a reduced grain size that would prevent the use of the ultrasonic test for verification of complete transformation.

Evaluation of radiograph film and destructive examination of caps from slugs rejected at radiograph inspection has been made to provide a basis for a more accurate radiography specification. It is apparent from these data that a more stringent standard for porosity in the weld bead is necessary.

PROCESS DEVELOPMENT

Uranium Processing

All dingot uranium is now outgassed prior to canning to remove hydrogen. A study was undertaken to determine the minimum time required for vacuum outgassing to eliminate

all voids caused by hydrogen in the Al-Si bonding layer. Degreased eight-inch slugs were placed in vacuum canning tubes; the tubes were evacuated and submerged in Al-Si at 620 C for times ranging from 20-60 minutes. Preliminary results indicate voids in the Al-Si caused by hydrogen are virtually eliminated after heating 20 minutes in a vacuum.

The irradiation of nine tubes of dingot slugs charged in 105-F under Production Test 105-596-A is complete. Six of these tubes were examined after exposure to 300-900 MWD/T. One of the control tubes was discharged due to a core failure of a dingot slug at 844 MWD/T. To date, no significant differences have been observed in the dimensional behaviour of the dingot and ingot slugs in this test. Of 1050 tubes of dingot slugs charged for low goal exposure at 105-C, 35 have been discharged. One "hot spot" jacket failure occurred at 227 MWD/T and 904 KW/tube in metal from lot V-803.

Ultrasonic bond test examination of the twenty control tubes for Production Test 613-A-54-MT (delay quench-rod form), to determine the irradiation stability of normal uranium heat treated by a modification of the current process, have been completed. Bare and canned slug measurements have been obtained and the material arranged in the desired latin square charging pattern. Estimated pile charging date is mid-April.

Assembly Process Development

A hot-pressed fuel element with improved can wall thickness, resistance to scoring during charging, and uniformity of processing has been developed. Pressing and pre-irradiation processing of the solid core hot-pressed fuel elements for a new pile test have been completed. Chisel tests and metallographic examinations indicated that the jacket could be loosened from the core in certain areas of the U-Ni compound layer; however, the bond is more adherent than that produced by dip canning. One of the fuel elements failed during autoclaving. Destruction was so complete that it is impossible to determine the cause of failure. The cap will be examined for possible defects.

The fuel element produced by the hot-press process has a fully annealed aluminum jacket which makes it susceptable to damage before and during pile charging. To decrease the softness, the present process includes an anodized coat for jacket protection. An I&E fuel element, uniskanned part way along the slug length, was examined for work-hardening of the jacket. Examination revealed no damage to the bonding layers, less than 0.001 inch wall reduction, and a 0.010 inch fine-grain jacket surface. Superficial hardness tests indicated an average hardness of Rockwell T 44 on an as-canned hot-press jacket and an average of Rockwell T 63 on the uniskanned surface. Other methods of eliminating jacket softness will be investigated.

The effects of irradiation on the physical and metallurgical properties of hot-press bond are being studied using tensile specimens with U-Ni-Al and U-Ni-Fe-Al bonds. Four specimens (two U-Ni-Al and two U-Ni-Fe-Al) were irradiated to 300 MWD/T with a bond inferface temperature of 200 C. When opened by Radiometallurgy, one U-Ni-Fe-Al specimen fell apart; the others remained intact. It has not been determined where the bond failed. Three U-Ni-Fe-Al specimens that were pressed for irradiation but rejected because of machining, were tested for bond strength. The ultimate strengths of these bonds were over 11,100 psi, or stronger that the yield of aluminum.

DECLASSIFIED

One hundred fifty-nine vacuum hot-pressed slugs were received from Sylvania Electric Products for evaluation. Preliminary tests indicated that the diameters of these fuel elements varied from 1.419 to 1.437 inches (an unusually wide range), the surfaces were rough and scored, and, 29 of the pieces had incomplete bonding at the closure upon application of the Dy-Chek test.

The receipt of components from Alcoa for pile testing slugs having tru-line end contours (PT 105-520-A-65-MT) has been delayed. A preliminary shipment of 200 cans is expected at Hanford by April 3; the rest should be received later in the month.

Radiometallurgical examination of cold pressure welded (point closure) fuel elements, the last of which were discharged in April 1955, has been completed. The first of the two failures occurring in this material was found to be due to cleavage of the uranium core at about 300 MWD/T. The cause of the second failure could not be positively determined. Conclusions drawn are: (1) further improvements in processing technique and inspection methods are required to make the process pratical for production use, and (2) with adequate control and inspection the process appears feasible and economically advantageous for present pile operating conditions.

DEVELOPMENT OF NEW FUEL ELEMENTS

Reactivity and Conversion Ratio

Calculated reactivity and conversion ratio effects for the I&E slugs now being irradiated in C pile and for the proposed K pile slug are presented below. Each type of slug was compared to a standard solid slug loading for the type of pile indicated.

Slug Type*	Amount of U in Slug Compared to Std. Solid	Reactivity Effect Inhours	Conversion Ratio Effect
Std. solid in either pile	Same	0	0
I&E (A) in C pile	-7.7%	-310	-0.4%
I&E (B) in K pile	-3.2%	-270	+1.2%

*Std. solid slug, 1.336" uranium diameter
I&E (A) uranium dimensions; 1.370" X 0.479" I.D.
I&E (B) uranium dimensions; 1.394" X 0.464" I.D.

Recent preliminary measurements in the Test Pile indicate a reactivity loss of about 220 inhours and a very small loss (< 1%) in conversion ratio for the C pile (type A) I&E slugs as compared to the standard loading.(1)

Reactivity measurements have been made in the Test Pile, comparing the one-piece I&E slug and the wafer I&E slug with the standard solid slug. The results of these measurements are summarized below:(2)

Slug Type	Volume % Al Spacer Material	Reactivity Effect in 8 3/8" Lattice, Inhours
Std. solid	0	0
One-piece I&E	0	-173
Wafer I&E	3.5	-273

(1)Private communication, W. E. Niemuth, Experimental Physics.
(2)Measurements by H. A. Fowler, Experimental Physics.

These measurements indicate that replacement of 3.5 percent of the uranium volume in an I&E slug with Al-Si spacers would involve a reactivity loss of about 100 inhours for a full pile load. This is in good agreement with previous calculations of the effect of various volume fractions of spacer materials for the case of solid slugs,(1) and with measurements of the reactivity effect of changing aluminum cap and can thicknesses.(2) From the neutron economy standpoint a negligible error is introduced with the assumption that Al-Si is 100% aluminum.

Wafer Fuel Elements

Preliminary investigation has revealed intergranular corrosion of the inner cooling tube of one of the wafer fuel elements irradiated in the Materials Testing Reactor. Although the coolant temperature was approximately 35 C, a maximum water film temperature drop of 131 C was calculated for the internal cooling surface.

Internally and Externally Cooled Fuel Elements

Four tubes (28 pieces) of lead dip canned I&E slugs and four tubes (28 pieces) of comparison standards (eight-inch solid slugs) were charged at C pile on March 15 under PT 105-613-A-63-MT. Temperature monitoring equipment indicated an average outlet temperature of 85 C for the tube-slug annulus and 75 C for the central hole at an equilibrium power level of 1550 MW. Tubes of I&E slugs are generating five to ten percent more power than the tubes containing comparison standards. During startup a temporary "hot spot" occurred in the lower third of the pile that encompassed the tubes in this test. One of the four tubes containing the dip canned I&E slugs was discharged a week later when abnormally high annulus water temperatures were indicated by one of the two annulus thermocouples. The tube was immediately re-charged with similar slugs. Visual examination of the discharged slugs indicated that as many as eight pieces may have been misaligned in the tube. The higher water temperatures between the top of the slug and the tube (180° from the ribs) were evidenced by the film patterns observed. One of two annulus thermocouples was placed in this position in the re-charged tube. Subsequent operation at 1650 MW showed a temperature of 91 C in this position compared to 70 C between the ribs and in the hole. The normal temperature difference between the annulus temperature at three o'clock and nine o'clock positions and the hole temperature appears to be 10-15 C.

The twenty, anodized, hot-pressed, hollow, I&E fuel elements, for in-pile outlet water temperature tests (Production Test 625-A-70-MT) are undergoing pre-irradiation measurements for determination of weight, diameter, length, and warp. A final inspection reject was found to have a non-uniform nickel plate on the core I.D. The non-uniformity is believed to have been caused by gas evolution from the horizontal core positioning during the nickel-plating cycle. A minimum of 0.0005 inches of nickel plate is necessary to insure proper diffusion bonding of the core to the jacket and to prevent U-Al diffusion. Metallographic examination is in progress to establish the minimum nickel plate thickness on this group of I&E fuel elements.

Equipment modifications are underway on the four-unit press used in canning I&E fuel elements for Production Test 313-45-MT. The I&E bare core examinations are 75 percent completed. Aluminum jacket components are scheduled for shipment from Alcoa about April 28, 1956.

(1) HW-39219, "Relative Economics of Wafer Slugs", J. W. Finnigan, 10-20-55.
(2) HW-33088, "Reactivity Effect of Uranium Diameter and Cap Thickness Changes," A. W. Thiele, 9-17-54.

DECLASSIFIED

New canning tongs have been developed to prevent floating of the well-type cap-tubes of I&E fuel elements after assembly and prior to quenching. These capping tongs lock the cap to the can by two conical indentations diametrically opposite and extending outward from the well of the cap into the wall of the can. Approximately 50 slugs were canned by this method, with a yield comparable to that obtained with the previously used weights. A modified 45 second cycle (two overlapping 90 second cycles) is now being used. The can-sleeve pre-heating time and the slug pre-heating time in the lead were reduced to allow more time for core and tube assembly. Time-temperature tests indicate that I&E slugs require approximately nine seconds less time to attain 600 C than a solid slug during standard process pre-heating.

Five "exposure" tube charges (28 slugs/tube) of fuel elements with three-piece jackets were sent to C pile. Tubes containing fuel elements with two-piece jacket components will be irradiated to rupture as the three-piece jacketed fuel elements may not be representative of future I&E production.

Although the oxide contamination in the weld bead of an I&E fuel element due to poor arc-striking conditions has been largely eliminated there are oxides still present. These are believed to be a result of (1) unsatisfactory braze layers, (2) burrs and wire edges formed during facing, or (3) contaminants at or near the weld zone, i.e., grease, oil, dirt. A welding test is in progress to evaluate the adequacy of the present welding technique.

Since the nickel plate on the inside bore of an I&E fuel element is not being deposited uniformly when the piece is plated in a horizontal position, a rack is being fabricated to permit plating in a near vertical position. This will permit rapid release of the gas from the inner bore and thus eliminate one cause of the non-uniform plate deposition.

Tests are being conducted to determine the critical mass during canning of I&E uranium cores with 1.44 percent enrichment. The limiting condition will be approached during slug pickle, canned slug etch, and autoclaving when the slugs are water moderated.

Self Supporting Fuel Elements

Experimental work is continuing on fuel elements for ribless process tubes. Methods under development are (1) attaching supporting ribs to the fuel element jacket by stud and heliarc spot-welding, and (2) using smooth surfaced slugs in a corrugated tube liner. (The tube liner would be thin zirconium sheet with embossed supporting ribs that extend the length and width of the liner.)

Autoclave tests were performed to evaluate the self-supporting slugs. Projection-type and smooth surface slugs with a hole drilled in the jacket were placed in ribless process tube sections and autoclaved until the slug was swollen tight in the tube. Upon opening, it was observed that the fuel elements with one-inch long ribs scored the tube less than fuel elements with 1/4-inch diameter studs, and that neither appeared to score the tube much more than regular smooth slugs. Fuel elements in the tube liners were badly scored and the tube was moderately scratched, partly due to the large size of the rupture. However, the test did indicate that tearing of the tube liner could occur during discharging. The fuel elements with full length ribs badly scored the tube. In addition, the ribs had been twisted loose and had caused gouging of the jacket.

Component Designs

Fifty fuel elements were selected from etch penetration and the caps faced to 0.125 inch to test slugs having thinner cap and base dimensions. The present base thickness for eight-inch fuel elements is 0.175 inch and the cap thickness is a nominal 0.340 inch. The minimum practical reduction in base dimensions was to 0.100 inch. It is believed that plutonium production can be increased by about six percent by reducing the cap and base and thus enabling the addition of an extra slug per tube charge. The principal difficulty found in using thinner caps was encountered during welding with a higher percentage of overhang rejects and poor bond rejects. Slight surface cracking of the caps in the preheat zone was observed. Destructive examination of the welded caps disclosed blistering of the Al-Si underneath the preheat zone and along the circumference of the cap where a two pass preheat cycle was used. An additional quantity of slugs having a 0.125 inch cap thickness will be welded to establish an optimum welding procedure that will not damage the cap or the cap-core bond.

Slugs with special caps (a one-inch truncated cone projection, 5/8 inch diameter base, 1/4 inch diameter top) are being fabricated for Pile Coolant Studies Unit for use in pile tubes having reduced rib heights. This cap design will allow the high temperature water between the low ribs to mix with the water in the remaining annulus, thereby resulting in more uniform water temperatures around the slug and reducing the potential for severe corrosion due to localized high water temperature zones.

MATERIALS DEVELOPMENT

Zirconium and Zirconium Alloys

A fifty-foot length of zircaloy-2 ribbed process tubing was produced by inert-arc butt welding three shorter length pieces. Because of warp, the tube lengths were hand welded. Radiographs of the welds showed them to be free of voids, pinholes, and contaminants, and to have full penetration. Following welding, six test samples were prepared for flow lab, mechanical, metallographic, and corrosion testing.

Two short extruded blanks were successfully tube reduced to KER-size process tubing by the Tube Reducing Corporation. The finished tube lengths before cropping were approximately 25 and 33 feet.

A study of the short time annealing of zircaloy-3 was completed. Excellent ductility was achieved by annealing 50 percent cold worked material at 725 C for one-half minute. The results of a flow stress recovery test of zircaloy-3 indicate that the room temperature tensile test yield strength of 60 percent cold-worked zircaloy-3 decreases from 84,000 psi to 40,500 psi after 50 days at 400 C. A yield strength of 35,000 psi has been observed for fully recrystallized material.

Aluminum and Aluminum Alloys

Development of process tubing from Alcoa alloy M388 (1% Ni) is proceeding rapidly with completion of the order expected in April. Progress on a similar development contract for making process tubing of aluminum powder metallurgy product (APMP) alloy M257 has been slow because of the poor workability of the alloy.

DECLASSIFIED

Estimates have been made of the temperatures at which creep will limit the life of process tubes. For 1100 (2S) aluminum, outlet water temperatures above 105-C should give rise to a significant amount of creep. The same point is reached for 6063 (63S) at temperatures above 170 C, while APMP tubes would be capable of operating at temperatures above 200 C, if creep were the sole limiting factor. The creep limit for process tubes of M-388 should be somewhere between those for 1100 and 6063 alloy, a more quantitative estimate not being possible at this time.

One hundred and four slugs were canned with M388 alloy components for PT 104-622-A-68-MT. The slugs were assembled using the 50 second (long submerge) canning cycle. The components were immersed in Diversey 514 etch for three minutes. A 60 percent yield was obtained, bond rejects accounting for the majority of the unacceptable material. Destructive examination of the reject pieces showed only three pieces of 44 to have non-wet areas.

Uranium Alloys

When uranium-1.5 a/o silicon wafers are quenched from 890 to 910 C, partial precipitation of the silicon occurs on certain preferred cyrstal faces. Quench cracking occurs, but distortion after aging is limited to those grains exhibiting no precipitation of the uranium silicon compound. Quenching from below 885 C resulted in complete precipitation of the compound.

Distribution of Uranium Hydride in Uranium

A metallographic study was made of the variation in the size and population density of uranium hydride particles in uranium with the variation in cooling rate from 600 C. As the cooling rate decreased, the average size of the uranium hydride particles increased, and the population density of uranium hydride particles decreased. In some instances, the uranium hydride precipitated at carbide inclusions and in every instance the hydride particles were found at the uranium grain boundaries.

Corrosion Studies

Aluminum corrosion tests to establish long term corrosion rates are now in their fourth month of exposure in a flowing autoclave with 350 C deionized water. With the possible exception of 32S alloy, none of the alloys tested have shown an increase in corrosion rate with time.

Slugs jacketed with M388 alloy were discharged from H loop after 31 days exposure in neutral deionized water at bulk water outlet temperatures of about 195 C. Maximum weight losses before stripping were approximately six mils per month. Weight losses were comparable to those of 2S aluminum under similar conditions. No sign of intergranular attack of the M388 was noted, though weight losses are considerably higher than those recorded elsewhere at similar temperatures. Coupons of alloys M400, X2219, and 2S, suspended in the out-of-pile section of the loop for ten days, showed corrosion rates like those irradiated in-pile at similar corroding surface temperatures.

A minimum corrosion penetration of two mils per day was found for 1100 aluminum in one percent uranium nitrate hexahydrate solution at pH 2 and 100 C. The penetration rate was determined by refluxing aluminum samples in the uranium nitrate solution for five days.

Experiments to determine corrosion resistance of uranium with special cladding (insulated and defective) were run in the high temperature loop. The experiments were:

1. The uranium was heated to 700 C and maintained at that temperature during exposure to 300 C water.
2. The uranium was heated to 700 C, the power turned off, and 300 C water was admitted to the defective can.
3. The uranium was not heated beyond the reaction chamber temperature at any time during the experiment.

The unheated specimen corroded in an irregular manner with pits and channels as has been previous observed. The heated specimens from both the preheated and the sustained heat experiments, corroded in a uniform manner with six mils removed from one core and 15 mils from the other. This is the first case in which uniform corrosion has been observed for a canned specimen.

Accelerated tests of the corrosion resistance of sealed anodic films in boiling 5% Na_2CO_3 and in boiling 1% HCl/3% NaCl are being made. It has been established that: (1) oxalic acid coatings are superior to sulfuric acid coatings (standard alumilite), and (2) deionized water is a better sealing medium than silicic acid. Preliminary data indicate that shorter seals at higher temperatures are superior to the current sealing cycle of forty hours at 170 C. The best seals were obtained at temperatures of 200-250 C for a time of six hours.

Pieces with artificial inclusions and standard production pieces were corrosion tested in the 314 flow loops in 100 C process water. In all cases the corrosion was uniform except that the inclusions, the weld bead, and the preheat pass all corroded at a much lower rate.

A study to determine the effects of chloride and others ions, contained in process water, on corrosion rates has been initiated. It is postulated that the high corrosion rates noted in the pile are a result of a combination of ions in the water. These studies are designed to determine which combination is corrosive and how this corrosion may be inhibited.

Bake Tests

Fuel elements assembled by lead-dip, single-dip, triple-dip, and hot-press methods were baked at 300 C for 100 hours without causing any detectable bond deterioration. Earlier investigations had indicated extensive deterioration under these conditions. As in the earlier investigations, undercutting resistance of the fuel elements was used as a measure of the bonding integrity. The jackets were perforated with sixteen 1/16 inch holes and the fuel elements were then autoclaved in 170 C water.

No. of Fuel Elements	Canning Method	Baking Time (hrs.)	Temperature (°C)	Time to Failure (hours-avg.)
6	Single dip	100	300	13
6	Single dip	none		14
6	Lead dip	100	300	26
6	Lead dip	none		26
6	Triple dip	100	300	17
6	Triple dip	none		14
3	Hot press	100	300	6
3	Hot press	none		7

Additional data will be obtained at higher temperatures and additional periods of time.

DECLASSIFIED

TESTING METHODS AND EQUIPMENT

Metal Quality Tester (MIZ-2)

Of the 45,000 slugs which have now been tested with the prototype Metal Quality Tester, about 1600 have been charged into KE and KW. Rejection rates on K lot slugs are running close to five percent. This is in good agreement with the standard which was selected on the basis of a five percent reject rate. The M lot standard is apparently better than the average current M lot with a rejection rate of ten percent. Mechanical equipment is being designed for this test which will increase the test rate.

In-pile testing has begun on slugs categorized by the Metal Quality Tester as the poorest five percent and the best 95 percent determined by internal structure defects in the slug cores such as cracks, striations, and inclusions. Tubes for the irradiation of the lower five percent material and the upper 95 percent material will be selected randomly. Charging will be done by lots so that no upper 95 percent material will be charged into the same tube as lower five percent material. The differences in failure rates between the MIZ-2 categories will be determined directly from the number of failures occurring and the number of tubes charged.

Automatic Roll Type Conveyor

An input mechanism designed to feed slugs to the automatic roll type conveyor from a skate wheel transfer conveyor is 90 percent complete.

Internal and External Testing Equipment

A new I&E test probe is being designed to incorporate both the bond and penetration test sensing devices in the same probe. A mechanical breadboard of the equipment for retracting the probe during the loading cycle on the automatic conveyor and then driving the probe through the internal hole to a testing position has been built.

Internal Friction

A test of the change in internal friction after small deformation using carefully controlled temperature has indicated, if theory is correct, that the change in the total number of dislocations or of total dislocation length per unit volume is more important than dislocation pinning in the internal friction decay after a small deformation (or temperature change).

Work was resumed in development of the apparatus to measure internal friction at high temperatures. This measurement is still limited by inability of existing equipment to pull a sufficiently high vacuum, and attempts to use the system with helium and argon were unsuccessful in suppressing the glow discharge during heating. However, with improved power control of the induction heater, temperatures up to 300 C have been achieved.

IRRADIATION BEHAVIOR

Evaluation of Cored Slugs

The comparison of slugs from PT 607 (irradiation of four-inch enriched cored slugs with 3/8 and 5/8 inch core diameters) has revealed with 99.95 percent confidence that

the slugs with the 5/8 inch holes are superior. No difference was shown between the aluminum end plugs and the welded uranium end plugs. Irradiation data from this test are as follows:

Tube No.	Core Size Type Plug	Est. Discharge Exposure (MWD/T)	Est. Specific Power (KW/ft)	No. Enriched Pieces	Rupture
2065-C	3/8" U	489	85	5	yes
2165-C	3/8" U	483	85	5	no
2063-C	3/8" Al	512	88	5	yes
2164-C	3/8" Al	438	84	5	yes
2163-C	5/8" Al	1000-1200	92	5	no
2004-C	5/8" Al	1000-1200	87	5	no

Both types of slugs were elliptical in cross-section with a difference between the major and minor diameters ranging from 20-59 mils. The maximum diameter change on a 3/8" slug was 17 mils compared to a maximum change of 10 mils on a 5/8" slug. The slugs were broken and examination of the fractured surfaces revealed that both types of slugs operated with the metal adjacent to the hole in the beta phase as shown by a columnar grain structure. The slugs with 3/8" core diameters operated with about twice as much uranium in the beta phase as the 5/8" slugs. Preliminary observations of the broken slugs indicated that four of the ten slugs with 5/8" holes contained single cracks about 1/4" long at the inner surfaces, and that ten of the seventeen slugs with 3/8" core diameters had cracked more severely. Thus, it appears that the elliptical cross-sections resulted from the two phase operation rather than from the internal splitting, particular in the case of the slugs with 5/8" holes. The dimensional behavior of these enriched slugs should not be taken as indicative of the behavior of regular metal slugs of similar geometries since the enriched slugs had been triple-dip canned four to five times prior to being canned for this test.

A study of the dimensional data compiled on cored slugs revealed that warp and expansion due to splitting may cause operating problems. The warp observed on cored slugs is similar to that experienced with solid slugs. Internal splits which appeared in cored slugs at 200-300 MWD/T became more severe as the exposure increased. The maximum warp noted was 100 mils at an exposure of 850 MWD/T. A maximum diameter change of 72 mils was observed at an exposure of 825 MWD/T.

A tube of alternate extruded and drilled cored slugs discharged at 825 MWD/T have been examined. It was observed that the extruded slugs had split more severely than the drilled slugs. A maximum diameter change of 72 mils was observed on extruded slugs compared to 34 mils on drilled slugs.

Examination of Powder Metal Compact Slugs

Analysis of the dimensional data from PT 576 (irradiation of power metal compact slugs) indicates that warp and diametral growth of these slugs is not significantly different from the warp and growth of four-inch alpha rolled control slugs. No improvement in rupture resistance was noted with the powder metal compact slugs.

Fuel Element Jacket Failures

During the past five months there has been a significant increase in the slug failure incidence at 105-H and 105-DR apparently caused by water entry into the slug jacket resulting from jacket corrosion or circumferential failure of the can at the cap-slug

DECLASSIFIED

junction. Although examination of the majority of failures from 105-H indicated that excessive corrosion resulted from reduced process-tube rib height, it was suspected that slug quality might also be a factor. Over sixty percent of the failures at DR and H were canned during July and August 1955. H and DR were the only reactors to irradiate to high goal exposure solid slugs canned during this period. Investigation of canning history of these slugs revealed (1) the long preheat - short submerge (45 second) canning cycle was used on about sixty percent of production from June 23 to July 28, and exclusively thereafer, replacing the long submerge (50 second) cycle; (2) spray pickling of bare uranium slugs replaced dip pickling on May 30; and (3) canning bath temperatures were reduced in July to curtail can wall penetration by the Al-Si. In addition, canned slug reject rates for braze layer porosity, bond soundness, can wall thickness, and can wall surface defects were high during these months.

FACILITIES AND EQUIPMENT DEVELOPMENT

Project Proposals

A cost review of Project CA-546 (Fuel Element Pilot Plant, 306 Building) shows that it will be completed within available funds. A transfer of costs totaling $5000 was made from the project to capital equipment covering five recorder-controller instruments. Office space construction should be completed on schedule, April 6, 1956, and the furniture delivered by April 9, 1956. The chemical processing room is essentially complete except for the anodizing equipment. Occupancy of the plating laboratory is expected in mid-April. The major items to be completed at this time are the installation of additional lighting and assembly of the anodizing equipment.

A request for preparation of a project proposal (I&E Fuel Element Semi-Works, 306 Building) was issued on March 2, 1956. A letter proposal was prepared requesting preliminary authorization of design and critical equipment procurement. The cost estimate for this preliminary work is $120,000 with total project cost estimated at $400,000.

The revised project proposal (CG-620, Melt Furnace) totaling $143,000 was approved by General Electric and transmitted to the local AEC office where it was approved on March 22, 1956. Washington approval will require a minimum of six weeks.

The justification of the project (Corrosion Testing Facility, 314 Building) has been revised and the proposal is now ready for General Electric approvals.

The project proposal for the 350 C flow loop was transmitted to the local AEC during the month and approved on March 29, 1956.

PHYSICS RESEARCH SUB-SECTION

Lattice Physics

During March buckling measurements were determined for nine different lattices in the small 4' x 4' exponential piles with enriched uranium (1.007% by weight U-235) and for one five-tube, natural-uranium, cluster element. The data follow with natural uranium comparison values given for some tests.

Test No.	Lattice Spacing	Fuel Size	Al/U (atomic ratios)	C/U (atomic ratios)	H_2O/U (atomic ratios)	Buckling (10^{-6} cm^{-2}) Enriched	Buckling (10^{-6} cm^{-2}) Natural
1	6-3/16"	0.925" D	0.69	100.4	-	356	114.5
2	"	"	0.59	95.6	-	367	
3	7-1/2"	"	0.69	148.4	-	313	95.3
						Dry	Wet
4	6-3/16"	1.66" OD 0.94" ID	0.25	42.3	-	253	
5	"		0.25	42.3	0.18		306
6	7-1/2"		0.25	63.2	-	375	
7	"		0.25	63.2	0.18		409
8	12-3/8"		0.25	177.8	-	222	
9	"		0.25	177.8	0.18		226
10	10-3/8"	5-0.925"	0.52	52.0	-	63	

Note should be taken of the fact that in all cases the bucklings of the dry enriched I and E slug lattices are less than the values for the wet lattices. In the wet lattices, the water simulated central slug cooling only and, for these tests, available small diameter tubing was used. Slightly over one-half the core volume was water, thus showing the effect of tube boiling. The tests will be continued with full cooling water channels.

Test No. 2 was made with a continuous rod of uranium and shows the reactivity decrease caused by the 0.4-inch spacers used to simulate end caps. A comparison of the natural and enriched values shows the reactivity gains resulting from increased U-235 content.

DECLASSIFIED

Graphite stacking for the 7-1/2-inch lattice, high-temperature, exponential assembly was completed through two thirds of the lattice region. This experiment is designed to determine the effects of temperatures up to 300 C on the buckling (or reactivity) of a lattice.

Lattice Calculations

Disadvantage factors (ratio of flux at the slug surface to the average over the interior) have been calculated for a series of cored slugs of varying enrichment and different internal diameters. Bucklings are also being calculated. These calculations are being carried out to permit a compromise choice between a slug which will exhibit the least thermal stress and which will also require the least enrichment for reactivity when used in the existing Hanford reactors. Disadvantage factors have also been calculated for solid natural slugs at 100, 200, and 300 C under conditions of the hot exponential experiments.

Using an improved method of P_3 approximation to transport theory, calculations have been made of the thermal flux in a dry 8-3/8-inch lattice with solid slugs. The thermal flux curve in the fuel remained unchanged but the values in the graphite were brought into better agreement with those obtained from experiment and diffusion theory.

The flux traverses taken in the central graphite region of KW and KE reactors preceding startup have been analyzed according to their directional cosines with respect to the co-ordinates of the piles. The spread of the diffusion length values of these 88 central traverses in each pile was reduced by 18% for KW and 23% for KE. The average diffusion lengths corrected for streaming and corrected to a solid graphite stack of 1.6 density are 52.8 cm for KW and 53.5 cm for KE. The corresponding diffusion lengths when only density corrections are applied are 55.2 and 55.04 cm.

Lattice Testing Reactor

Studies were conducted this month aimed at determining the number of lattice units required in the LTR core to get a neutron spectrum characteristic of the lattice. The experiments were done with a 7-1/2" lattice in the LTR core, and consisted of measurements of the mass of copper required to poison the central 18 inches of the central cell to $k_\infty = 1$. The measurements were made as a function of the number of fuel rods present in the core in addition to the rod under test. Zero, four, six, eight, and twelve additional or buffer rods were used. The results showed that as rods were added, the copper required to poison to $k_\infty = 1$ decreased from a maximum value for no buffer rods to an equilibrium value obtained with six rods. Buffer rods added beyond six caused no further change in the poison requirement. This result is important in that it indicates that the neutron spectrum in the test cell seems to become characteristic of the test lattice with only six buffer rods around it.

A measurement of the neutron absorption cross section of copper was made using the LTR. This is an important quantity in interpreting k_∞ measurements made by the lattice poisoning technique. Literature values of this cross section are believed to be accurate to ± 3%. The measurement made this month compared the neutron absorption in copper to that in gold. This produces a relative cross section of copper to gold. Since the gold cross section is known to about ± 1/2%, it is

believed that the LTR measurement of the copper cross section will produce a value considerably more accurate than the current ± 3% value. At this time it appears that the accuracy will be about ± 1%.

Changes to existing equipment and additional equipment provided included: motorizing the shielding doors, a method of pressurizing the reactor room to obtain a better value of the barometric coefficient, installation of the remotely operated flux traverse device, and fabrication of foil rotators designed to give uniform foil irradiations.

Work continued on facilities required for the temperature coefficient of synthetic high exposure slugs. The electrical wiring has been completed and arrangements made to move the vacuum insulated core heater to 305-B for testing. Fabrication of fuel slugs has begun.

Thermal Test Reactor

Work has continued on the wiring of Thermal Test Reactor components. All electrical control wiring has been completed and the mechanical components have been operated. Instrument wiring is being run between Control and Reactor Rooms. All fuel elements have been received (1678 pieces, 3740 grams of U-235).

Nuclear Cross Sections

Preparations were made for measuring the fission cross section of U-235 relative to the absorption cross section of Au-197. In this experiment a thin gold foil and a U-235 fission foil are irradiated concurrently in the diffracted beam of the spectrometer. The absolute activity of the gold foil is measured to obtain an absolute value of the neutron flux through the fission foil. From this value, plus knowledge of the counts accumulated in the fission chamber during the irradiation, an absolute value for the fission cross section of U-235 can be computed. Several irradiations are required to obtain data on background and order corrections. Data taking commenced on this experiment but was interrupted by a pile scram.

A plutonium foil suitable for measuring the fission cross section of Pu-240 was mounted in a fission chamber.

Fabrication of components required for automation of the DR neutron spectrometer has begun.

Instrumentation for Experiments

A report on a frequency modulated pulse height analyzer was prepared for publication in the open literature.

A device for moving wires under a radiation detector was made. This device is to be used in scanning wires and counting foils irradiated in the LTR and TTR.

A large NaI crystal was mounted on a photomultiplier to test the suitability of the crystal for capture gamma ray measurements.

DECLASSIFIED

Physics Problems Associated with Plant Operation

A general water lattice calculation was set up. This is being applied to E slugs since several tons are being produced and a serious nuclear safety problem exists on their behavior.

A multi-group (15 groups) calculation is being performed analyzing C and J slug lattices.

An analysis of nuclear safety was made of a continuous ion exchanger and the Z Area process specifications were checked for nuclear safety.

METALLURGY RESEARCH SUB-SECTION

Fundamental Studies

HW-41861, "The Corrosion of Selected Reactor Materials in Dowtherm 'A'," has been issued. The gist of this report is that the corrosive effect of Dowtherm "A" on the selected reactor materials (Al, Zr, U-Mg, U, and Mg) under conditions of the test were nil. The boiling organic darkened and became slightly more viscous during the 800-hour test, but this is the anticipated result of pyrolysis. Some fouling of the metallic surface occurred during the test. The extent of fouling on heat transfer surfaces under combined conditions of heat flux and radiation is perhaps the greatest unknown factor at this time.

KAPL powder metallurgy U-Mg specimens have been encapsulated in aluminum and shipped to the MTR for exposure. Two specimens will be irradiated to 1000 MWD/T and three to 3000 MWD/T prior to their examination in the radiometallurgy facility.

Three Th-U-235 alloy specimens have been encapsulated in zirconium containing NaK and shipped to the MTR for exposure. Dimensional stability of these specimens will be determined after 1, 2, and 3% burnup.

A Mg - 0.5 w/o Zr alloy low in chloride has been prepared from a master Mg - 30 w/o Zr alloy which was extremely high in chloride. Samples have been submitted for corrosion study, and if there is a many-fold increase in corrosion resistance over that of pure Mg, this alloy will be used in U-Mg matrix fuel material.

Laboratory investigations of the diffusion of uranium into zirconium and AlSi are continuing in order to provide a basis for interpreting in-pile diffusion experiments currently in progress. The results of previous studies have shown that the diffusion zone in mechanically constrained U-Zr couples is very non-uniform, apparently due to a lack of uniform surface contact.

Electron microscopy is a convenient means for studying fine structure in the microstructure of metallographic specimens. Detailed examination of a replica of uranium, irradiated to 1.5×10^{20} nvt, has revealed extensive twinning and cross twinning, resembling the twinned structure which develops as a result of applied stresses. The variation in the directional properties of the twins indicates considerable misalignment of the subgrains, which is consistent with observed kinking tendencies in uranium. A technique has been devised which will permit examination of a given area in an irradiated specimen at all levels of magnification and therefore permits correlation and evaluation between the macro, micro, and submicrostructure. Two Faxfilm replicas of the irradiated specimen are required. The first is used for electron microscopy, and the area under examination is correlated with the identical area in the second replica prepared for optical examination. Examination of such replicas therefore can cover the magnification range of 1X to 60,000X or greater.

DECLASSIFIED

DECLASSIFIED

Mechanical and Physical Properties of Fissionable Materials

Specimens of U - 0.35 a/o Cr, U - 0.5 a/o Ti, U - 12 a/o Mo, U - 23 a/o Si, U - 1.5 a/o Si, and Zr - 480 ppm hydrogen were heated in NaK filled zirconium capsules for four weeks at 400, 600, and 770 C (750, 1110, 1420 F) to determine the degree of attack of NaK on these alloys. The pieces were separated from each other by a Nichrome fixture that made contact with each of the pieces. The Nichrome fixture reacted with all of the alloys of uranium and with the zirconium at and around the point of contact for the 770 C (1420 F) exposure. Metallography on the exposed specimens is not complete; however, the areas outlined with scribe marks before exposure appear to be discernible on most of the specimens. The hydride phase was still present in the microstructure of the zirconium - 480 ppm hydrogen specimens exposed at 400 C and 600 C (750-1110 F), but the surface of the pieces exposed at 770 C (1420 F) was obscured by a deposit from the Nichrome.

Reactor Structural Materials

Some time ago it was observed here that vacuum annealing of slightly oxidized Zircaloy-2 greatly accelerated the reaction rate in air at elevated temperatures. After oxidation under identical conditions, four specimens were annealed in vacuo for different times. Upon resuming oxidation, the reaction rate of the vacuum heat treated specimens increased markedly compared to untreated control specimens, the increase being roughly proportional to the time of vacuum annealing.

Recent experiments with zirconium confirm this phenomenon and show that vacuum annealing before oxidation does not affect the reaction rate during subsequent oxidation. Oxidation followed by vacuum annealing produces a highly reactive surface on zirconium; the nature of this surface and the importance of this effect on the use of zirconium in reactors will be examined further.

A study initiated to compare the weight of a zirconium oxide film stripped from the metal on which it was formed, with its weight in situ has led to a more fundamental study of the oxidation process. Electron micrographs and electron diffraction patterns of stripped oxide films reveal a relationship between the orientation of the zirconium (also Zircaloy-2 and Zircaloy-3) grain and the orientation of the stripped oxide film.

Work has continued on the evaluation of spiral wound sheet as a potential fabrication technique for fuel elements. In the February report the thermal expansion data in the alpha range were given for a spiral wound uranium rod that had been cold reduced 83 percent in area by swaging. The thermal expansion behavior of this material was later found to be similar to that of swaged solid uranium rod for both alpha and beta cycles. Metallographic examination also revealed that none of the alpha recrystallized grains or the transformed beta grains penetrated the thin oxide layer between the sheets.

Fuel Materials

The examination has been started on the final two uranium-magnesium matrix samples irradiated at the MTR. These samples were irradiated to a calculated exposure of 20,000 MWD/T. Visual examination of the capsules disclosed no can damage. The samples were uncanned, and the sample which contained the silicon additive was removed from the can without difficulty. The sample with no silicon, however, was extremely difficult to remove from the can.

A series of canned uranium specimens have been exposed to 300 C water in the high pressure loop. The specimen cans are not bonded to the uranium, and each can is defected by a 65-mil hole prior to exposure. When water temperatures of 280-300 C and uranium temperatures below 400 C are utilized during exposure, the uranium is subjected to severe pitting attack by hydrogen. In one run, however, the uranium was maintained at 700-750 C during the exposure. This specimen suffered essentially no pitting attack. The uranium rod, originally 0.375 inch in diameter, measured 0.368-0.370 inch diameter after removal of corrosion product. During similar exposures uranium at lower temperatures was pitted to a depth of 0.090" to 0.110". Additional runs will be made to determine the lowest uranium temperatures effective in preventing hydride formation.

Uranium monocarbide has been prepared in small quantities for use as a cermet base material. Analysis of the product is presently being performed. The monocarbide has a density of 13.66 g/cm^3 and a melting point of about 2250 C which indicates it may be a satisfactory base material for cermet materials. The carbide can be handled in air at room temperature, but powders will ignite if heated to 400 C or ground in air. Preparation of the monocarbide, assuming the product is satisfactory pending analytical results, is relatively simple. Solid uranium metal is first converted to a fine powder through the hydride and is then reacted with methane at elevated temperatures.

Fuel Element Evaluation

Scintillation scanning was completed on the AlSi bonded solid slug from an MTR test which irradiated cored and solid AlSi bonded slugs according to GEH-4-1 to approximately 700 MWD/T. Results of the scintillation scanning showed a highly asymmetrical radial fission product distribution similar to that obtained from the cored slug from this irradiation. The concentration of fission products at one edge of the slug was 50 percent greater than that found at the opposite edge. No warp or other dimensional instability was associated with the highly asymmetrical flux distribution.

Two sets of cored insulated slugs have been irradiated in the MTR. Previous reports of this series indicated that the second loading was withdrawn after eight hours at full power when new power generation figures indicated the centers of the slugs were probably molten. The three slugs of the second loading have now been examined in the radiometallurgy facility. One was partially plugged by flow of molten uranium; one was completely plugged by flow of metal, and in one only incipient melting had occurred. This difference in behavior was caused by the flux gradients along the column of slugs.

DECLASSIFIED

Calculated values of thermal stresses and strains in fuel elements depend upon the model of mechanical behavior assumed for uranium. Stress calculations which use a time and temperature dependent model have been completed for solid fuel elements operating between 100 C to 350 C and 350 C to 600 C. For both cases the maximum temperature increases at a rate of 10 C/min for 25 minutes, then the temperature was held constant for 700 minutes. The calculated stresses after power increase and 700 minutes relaxation are given in the following table:

COMPARISON OF THE STRESS QUANTITY, σ_o, WITH DIFFERENT AMOUNTS OF STRESS RELAXATION

		Case 1	Case 2
Surface Temperature		100 C	350 C
Central Temperature		350 C	600 C
From Elastic Equations	σ_o surface (psi)	90,200	30,200
(independent of time, t)	σ_o center "	45,100	15,100
Immediately After Power	σ_o surface "	36,400	15,600
Increase (t = 25 min)	σ_o center "	18,400	920
After a Period of Stress	σ_o surface "	31,200	11,700
Relaxation (t = 722 min)	σ_o center "	14,300	~ 0

The stress quantity σ_o is the von Mises yield criterion for materials which are triaxially loaded. For a uniaxial tensile test, σ_o equals the tensile stress in magnitude. The von Mises yield criterion is the stress quantity which is used to compare the effects of plastic yielding and ultimate strength of ductile materials triaxially loaded to the test results obtained for tensile tests.

For Case 1, the low temperature case, stress relaxation occurring during the increase of power accounts for most of the stress relaxation. The stresses calculated with elastic equations are reduced by a factor of 2.5 at the surface and 3.15 at the center when plastic flow of the uranium is considered during the period of power increase. Further reductions of 14% in stress at the surface and 22% in stress at the center occur during 700 minutes' operation at constant power generation. For the high temperature case, Case 2, the stresses at the center of the fuel element are annealed out five minutes after steady state temperatures are reached. In fact, the central stresses begin to decreasing during the period of power increase. The maximum center stress, σ_o = 6,320 psi, is obtained at t = 11.4 minutes, T = 464 C.

Four rod cluster fuel elements are being fabricated for the KER and H-loop facilities. Two KER fuel elements were assembled during March. Assembly jigs for the fabrication of these fuel elements are being designed. Stainless steel tubing for 75 fuel elements is in stock. A test was made to determine the force necessary to separate two KER fuel elements from their locking device on discharge from a process tube. Eighty pounds was required to break one locking pin. A new type of locking ring that will disconnect more easily is now under construction. Heat generation and dimensional data pertaining to these clusters

have been sent to Heat Transfer Unit so that temperature and flow calculations can be made. Three H-loop fuel elements have been completed and sent to 100-K Area for rupture and flow testing. Twenty fuel rods have been autoclaved for forty hours in 330 F steam. The compression strength of the four rod H-loop fuel element was calculated. Using a safety factor of four, the working load is 15,000 pounds. One fuel element was tested at this load and no permanent bending occurred.

The exchange of thermal energy within the GEH-4 facility at MTR has been uncertain for some time. Two of the principal factors involved are the generation of heat within the slugs from the intrinsic gamma field in the MTR and the heat transfer to the loop cooling water from the higher temperature reactor water. To obtain a better understanding of these factors for calculations of temperature distributions within each experimental charge, a thermocouple lead slug was installed in the GEH-4 facility. After the reactor reached full power, calculations showed that the gamma heating was about 1 watt/gm, or for a solid uranium slug (Hanford standard) would be about 5 kw/ft.

Attempts are being made to produce a thin walled uranium oxide fuel element of high density (> 90%). The wall or jacketing materials considered are aluminum, zirconium, and 18-8 stainless steel. The tests are directed toward making an oxide element in one series of swaging operations. These swaging operations should produce, from a loose assembly of a metal cylinder, uranium oxide (powdered UO_2) and two end plugs, a finished totally enclosed fuel element. Swaging cannot be done directly on the thin walled jacket material. The high compressive stresses required for compaction of the oxide could not be retained by such a weak jacket. This jacket is therefore reinforced by an outer thick walled cylinder of mild steel. The mild steel cylinder is plugged at each end to retain the fuel element components. This entire assembly is then swaged to the proper size, after which the steel is removed mechanically or chemically. First attempts, using thin walled aluminum tubing and with Al_2O_3 instead of UO_2, show considerable promise. Al_2O_3 is being used to simplify and cheapen the exploratory phases of this new technique. Zirconium tubing will be tried when it becomes available.

The examination of a Zircaloy-2 canned uranium oxide fuel element which failed in the MTR continued. The slug was sectioned transversely approximately one-inch from the failed end which was calculated to be the hottest region of the slug. Numerous radial cracks and one circumferential crack, concentric with the jacket and approximately 5/8" in diameter, were observed. Several small pieces of the oxide fell out of the core after sectioning. There was nothing observed that would indicate that the core had melted in this region.

Simultaneously, densification and jacketing of uranium dioxide is being studied. Preliminary experiments have shown that a phenomenon similar to sintering occurs when powdered uranium dioxide is packed into a metal cylinder which is sealed and swaged to a smaller diameter. During the past month three such capsules were hot swaged to obtain preliminary indications of the effect of temperature on the degree of oxide compaction. Run of the plant Mallinckrodt UO_2 was tamp packed (to about 45 percent theoretical density) into sections of schedule 40 304 stainless steel pipe fitted with threaded end plugs which were subsequently welded in. Three such sections were swaged at about 600 C, taking a diametral

DECLASSIFIED

reduction of approximately 0.050" per pass. Cross sectional area (oxide) reductions of 39.8, 47.1, and 54.1 percent resulted in oxide densities of 66.9, 73.9, and 83.6 percent of theoretical. The experiments were stopped at this point due to difficulties encountered in swaging over the welds, and the capsules were sectioned for examination. The oxide compacted to 83.6 percent of theoretical density contained many small crystals of UO_2 produced during swaging. Surface area of the oxide was measured by nitrogen adsorption and was found to be essentially unchanged by the swaging.

Radiometallurgy Examination

Two more slugs were received from Pile Coolant Studies that have holes and excessive corrosion between the rib marks. The hole in each slug is one to two inches from the cap end. The two slugs were sectioned through the holes. The can wall adjacent to the rib marks is much thinner than on the side opposite to the rib marks. The can wall measurements on a slug received previously were 0.040 inch at 180° to the hole, 0.031 inch at 90° to the hole, and 0.020 inch adjacent to the hole within the rib marks.

A wafer from the slug that was up-stream to the rupture that occurred in the H-loop has been examined metallographically. On the side where the hole is in this slug, the aluminum can wall adjacent to the hole has an as-polished structure showing a moderate amount of AlSi eutectic. In this area the AlSi-uranium intermetallic gradually consumes the AlSi as it approaches the hole until the AlSi can no longer be identified. The macrostructure of the uranium shows an area immediately under the hole that has different characteristics than the rest of the sample. At the edges of this area the grains are assuming a columnar structure, sligned toward the hole. The microstructure shows the area under the hole to be relatively free of twins, with well defined grains and a large amount of intergranular microcracks. The remaining part of the sample is heavily twinned with very few microcracks. The indications are that at one time the area directly under the hole was above the alpha-beta transformation temperature.

Examination and sampling of selected slugs from Run V, Bluenose irradiation, has been requested by the Chemical Unit to accurately determine the radial distribution of fission products and correlate these results with those obtained by scintillation scanning. Grinding equipment has been designed for selective removal of 0.002-0.003 inch thick samples from a 1/4 inch thick bar sectioned transversely across an irradiated slug diameter. Preliminary results indicate that good recovery of the uranium from the silicon carbide grinding material is possible. Three selected slugs (Numbers 3, 19, and 34 from the front face of the pile) have been measured, photographed, and wafers scanned on the scintillation scanning equipment to determine which slug, if any, has a symmetrical distribution of fission products. Preliminary results show that slug 34 from the front face may possess the desired symmetrical distribution. Because of the low activity of the wafers scanned, they will be re-scanned in an attempt to improve the results.

Four preformed tensile sample assemblies from a production test (105-537), which was designed to obtain information concerning the effect of irradiation on the properties of bonds obtained by the current hot-press slug canning techniques, were received and opened. The tensile samples have a 1/2-inch long plated, beta heat-treated uranium mid-section, diffusion bonded to aluminum ends. Two of the samples have a nickel bonding layer and the others nickel-iron. The samples were irradiated to a calculated exposure of 300 MWD/T at a temperature of 200 C. Three of the samples were in good condition with no obvious warping or deterioration of the uranium or bond. The fourth sample, which had a nickel-iron bonding layer, broke during opening or had deteriorated during irradiation. Upon visual examination of the bonded uranium surface several areas were observed which appeared to have parted during the assembly opening operation. The remainder of the surface appeared much darker and may have parted during irradiation.

The examination was continued on the three externally and internally cooled wafer slugs which were irradiated in the MTR to an estimated 700-900 MWD/T. Metallographic examination of samples from the hot pressed rupture revealed intergranular corrosion attack on the internal cooling tube but none on the external can wall. The major intergranular attack, along with a reduced inner tube wall thickness, occurred where the aluminum spaces that were between the wafers joined the internal can wall. At some locations the nickel plate which had been placed on the uranium wafers prior to canning was not bonded to the aluminum can. The anodized layer which was used to prevent bonding of the uranium wafers to the aluminum foil spacers had broken down in localized regions with resulting uranium-aluminum diffusion bonding.

Examination continued on the ruptured zirconium process tube from the H high temperature loop. Hardness values taken on the tube sections showed the hardness ranged from 54 R_A to 62 R_A, with the lowest hardness occurring near the break. The hardness values for an unirradiated control sample was 55 R_A. These values are high compared to the usual values encountered for zirconium but are not unexpected considering the extensive working undergone by the tube during forming.

The length and diameter measurements were taken on two of the eight-inch unruptured production slugs which were representative of slugs that had suffered cap failures. These measurements of the bare metal show a minimum decrease in length along the axis to be 0.064" and a minimum decrease in length along the periphery of the slug from 0.029 to 0.047". This indicates that this problem is somewhat different from the previous "25M" type of failure which showed lengthening at the periphery. The diameter of the slugs had increased from 0.008 to 0.018", indicating little change in volume.

Metallographic examination of the slug that was upstream from the ruptured slug in the recirculation loop at H has shown that the aluminum can wall adjacent to a hole in the can has been completely diffused by the AlSi. Also observed in the uranium directly beneath this hole were many intergranular microcracks and a columnar structure which was aligned toward the hole. These observations indicate that temperatures of greater than 660 C were encountered at this location in the slug.

DECLASSIFIED

Separations Plant Structural Materials

Samples of type 304L and 347 stainless steel which had been subjected to a sensitizing heat treatment and samples of A-55 titanium in the "as-received" condition were exposed to solutions of 10 w/o oxalic acid for time periods ranging from 0.5 to 100 hours at temperatures ranging from 25 C to 101 C. The results of these exposures indicate that 10 w/o oxalic acid at temperatures of 80 C to 100 C appears to be a satisfactory repetitive cleaning agent, from a corrosion viewpoint, for stainless steel process equipment where relatively large corrosion rates can be tolerated for short periods of time. Corrosion rates of the two stainless steels investigated ranged from 0.006 to 0.020 ipm; three to ten times the corrosion rates observed for these materials in boiling 65 w/o nitric acid. Oxalic acid in most concentrations at temperatures above 35 C does not appear to be a satisfactory repetitive cleaning agent for titanium process equipment unless extremely large corrosion losses can be tolerated. Titanium exhibited corrosion rates on the order of 0.100 ipm in 10 w/o oxalic acid at 101 C; 500 times the rate exhibited in boiling 65 w/o nitric acid, and 0.5 w/o oxalic acid at 35 C exhibits a corrosion rate of 0.0001 ipm, almost equal to the rate observed in boiling 65 w/o nitric acid.

The expected serious corrosion problem in the Purex acid fractionators has made the investigation of nitric acid corrosion inhibition highly desirable. Other investigators have reported significant reductions in corrosion by nitric acid using urea as an inhibitor; however, previous work performed by this laboratory did not confirm these results. Re-examination of the testing techniques used by this laboratory and slight modifications of these techniques have resulted in agreement with other investigators. It appears that the addition of as little as 0.01 M urea to 65 w/o nitric acid may reduce the observed corrosion rate by as much as a factor of two to three.

The anticipated corrosion of selected candidate materials for heat transfer surfaces in the Purex waste acid concentrators has been evaluated. Specimens of type 312 stainless steel and grade A-55 titanium were tested as heat transfer surfaces in synthetic Purex waste acid concentrate. The corrosion rates of sensitized type 312 stainless steel (0.09 w/o C) ranged from 0.0012 ipm when the metal temperature was 115 C to 0.0030 ipm when the metal temperature was 165 C. The corrosion rates of annealed grade A-55 titanium were less than 0.00005 ipm, which is the accuracy limit of the determination, over the metal temperature range of 115-165 C. Similar experiments on sensitized type 312 stainless steel with the carbon content lowered to 0.03 w/o indicate the corrosion resistance of the low carbon material may be better by as much as a factor of two.

Five corrosion test heat exchangers were placed in the F-6, F-11, H-4, J-8, and K-4 concentrator overflow chambers in the Purex facility this month. These units are single tube calandria type heat exchangers consisting of a 2" schedule 40 stainless steel pipe shell, 3/4" schedule 40 stainless steel tube, and supplementary steam inlet and condensate return lines. A sample rack was attached to the end of each unit to hold corrosion coupons for "in-service" static tests. The test units will be operated in the overflow chambers under the same conditions as the process heat exchangers. These facilities will be used to obtain a better understanding of: (1) Where will the heat exchanger fail first, i.e., what is

DECLASSIFIED

DECLASSIFIED WITH DELETIONS

the weakest link in the concentrator design and construction? (2) How significant are the advantages of using type 304L vs type 347 stainless steel construction materials and what are the differences in actual field service between types 308L and 347 welding alloys? (3) Can service life expectancies be predicted on the basis of the data collected by our laboratory testing techniques, i.e., is there good correlation between laboratory data and field experience?

To relate the corrosion rates derived by autoclave type experiments to the corrosion rates obtained using heat transfer equipment, accurate measurements of the heat transfer surface temperature and the bulk metal temperature of the heat transfer specimen were taken. These measurements indicate that the surface temperature is 20 to 30 C less than the bulk metal temperature. A comparison of temperature corrected corrosion rates from the heat transfer units and corrosion rates from autoclave type tests reveal close agreement between the two methods.

Welding Development

The technology of Zircaloy-2 fabrication has not been developed to the extent that full length HAPO reactor process tubes containing ribs can be extruded. However, techniques have been developed which produce satisfactory butt welds for joining shorter lengths of this tubing. Experimental tubes for reactor evaluation have been joined and tested by radiographic examination. Although the radiographs and visual examination indicate acceptable welds, the post-pile-exposure examination of the experimental tubes will serve as a better evaluation of this welding method.

In an effort to improve the safety of operation and the quality of welding at HAPO, a new type welding machine, the AC-DC rectifier welder, has been tested and evaluated. It is concluded that the AC-DC rectifier welder will effectively perform the same operations as both the transformer and motor generator type welders. This machine is economical to operate, and several new safety features have been incorporated into the equipment. For these reasons, it is suggested that replacement and/or new welders obtained at HAPO be of the AC-DC rectifier type.

Plutonium Metallurgy

Preformed nickel cans for the alpha-plutonium pieces are currently being electroformed. Twenty-five mandrels were plated in the first three weeks of the month with a yield of four acceptable cans. The reject cans meet all the physical specifications but have minor macroscopic surface blemishes which put them in the spare

DECLASSIFIED WITH DELETIONS

parts category. This unusually low yield of acceptable cans can be attributed to such variables as agitation, electroplating bath maintenance, shielding, temperature control, and anode bagging. The correction of one variable would, in turn, disclose difficiencies in another. After much experimentation, an acceptable operating procedure for the low pH nickel chloride bath has been perfected. By using this modified plating procedure, a yield of 88 percent physically acceptable cans was realized. Development of electroformed copper cans continued throughout the month. A stainless steel plating mandrel has been machined in the shops. This mandrel will be used to determine the proper cathode shielding to obtain a copper electroplate thickness of ± 0.0005 inch variance or less.

The wall thickness of a previously made copper can had a variance of ± 0.0016 inch. This can was electroformed without cathode shielding. These high current density areas were also areas for excessive treeing of the electrodeposit. By proper shielding, the current density will be distributed uniformly and decrease the tendency for treeing, as well as enabling the attainment of thickness within the desired tolerance.

Two 304L stainless steel cylinders have been calibrated against water for use as density standards. Measurement of the dimensions to the nearest ten-thousandths of an inch and correction for thermal expansion gave a rough check on the accuracy of the determination. A lead density standard certified by the National Bureau of Standards failed to agree with either of these methods. The weighted average density of the 2 kg and 4 kg stainless steel standards was 7.8939 ± 0.0004 gm/cm^3 at 24.36 C. The lead standard's density was 11.261 ± 0.002 gm/cm^3 as compared to 11.267 ± 0.003 as certified.

Investigation of the oxidation of plutonium has been started using laboratory air as the oxidizing gas. A continuous record of the weight change was made by the recording balance. The sensitivity was 0.0002 mg/cm^2. The record shows that for 10 to 20 hours there is negligible weight gain as the plutonium surface darkens. Then, there is a rate of about 0.012 $mg/cm^2/hr$ gain at 60 C while greenish, powdery oxide builds up. The rate increases slowly, but this may likely be the result of increasing temperature through the oxide's insulating effect.

The production of PCTR synthetic slugs is slowly increasing. Extensive sampling has been done to determine segregation and composition limits of the cast alloy. These properties have been brought within the specified tolerances. As a result of the extensive sampling, it has been determined that a single sample is representative of the castings made from a given pour. Three slugs are cast at each pouring, and one of the sprues that must be removed becomes the analytical sample.

DECLASSIFIED

CONTACT ENGINEERING UNIT

PROJECT ACTIVITIES

Project CA-512

Revisions 3 and 4, for which $2,410,000 has been authorized, are now 61% physically complete. These two revisions include such items as poison column systems, filter plant backwash valve repair, cross-under drain installation, gamma monitoring, and steam plant improvements.

Project CA-548 (New VSR Tower)

Preliminary and scope drawings have been approved and the architect-engineer has been authorized to begin detailed designs.

Project CG-558

Overall construction of Phase I of this project is 52% complete. Phase II, F and H Areas, is 10% complete. As the result of more detailed planning, it is now believed that the major outages can be accomplished in six weeks. The effect of this reduced outage time on the overall scheduling of the major outages has not yet been determined.

Project CG-600

One meeting of the project representatives was held to approve certain changes in the valving of the B - C intertie.

Project CG-642 (Charge-Discharge at C)

One project representatives meeting was held to discuss the design criteria. The views on this subject appear to be so widely divergent that considerable negotiation will be required before an accord can be reached. One of the more controversial items is the method of handling the slugs as they leave the tubes. Design has presented two proposals, but as yet no agreements have been reached.

Project CG-654

Pre-scope drawings issued by Design have been reviewed and commented upon. Water plant criteria have been transmitted to Design.

ETR Liaison

The Division of Reactor Development has assigned HAPO two test positions in the ETR. One is the C 9 x 9 hole which will be shared with GE-ANP and the other is a 3 x 3 position in the reflector. A project proposal is being prepared to secure detail design funds.

SPECIAL STUDIES

The process study supporting the "Five Year Construction Budget Document" to be issued by Advance Engineering has been completed.

A review of the economies associated with enriched uranium and LiAl irradiation has been completed as a supplement to previous studies and the HAPO proposed test program outlined in HW-40555. It was concluded that the formerly used conversion ratios may be conservative. If test pile results bear this out, the enriched uranium - LiAl load appears more attractive than previously indicated.

DECLASSIFIED

DECLASSIFIED

PILE TECHNOLOGY SECTION

INVENTIONS

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

Inventors	Title
W. B. Tolley W. E. Roake	Process for Increasing Massive Metal Yield During Reduction

P. H. Reinker

Acting Manager - Pile Technology

PH Reinker:cvf

[redacted]

VISITORS AND BUSINESS TRIPS

M. L. Feldman, K. C. Dewalt, H. M. Ogle and J. D. Webster of the General Electric AED Department, Schenectady, New York visited Hanford on 3-15-56 to discuss plutonium technology and handling.

J. L. Matherne, ORNL, Oak Ridge, Tenn. visited Hanford on 3-19 thru 3-23-56 to discuss metal recovery plant operations and Purex process.

R. Messick and V. Reilly, duPont, Savannah River Plant, Aiken, So. Carolina visited Hanford on 3-19 thru 3-21-56 to discuss 234-5 operations.

W. G. Petty, H. J. Shaffer, C. M. Henderson and J. J. Fellows, Mallinckrodt Chemical Company, St. Louis, Missouri visited Hanford on 3-15-56 to discuss calcination problems.

R. B. Richards of Hanford visited the Battelle Memorial Institute, Columbus, Ohio on 3-1 and 3-2-56 and the Vitro Engineering Division, New York, N. Y. on 3-5-56 for the Reactor Handbook Editorial Meeting and discussions.

O. F. Hill of Hanford visited the University of California and Cal. Tech. Los Angeles, California on 3-5 thru 3-7-56 to recruit technical personnel.

R. E. Isaacson of Hanford visited the Dow Chemical Co., Rocky Flats Plant, Boulder, Colorado on 3-12 and 3-13-56 to discuss new multiplication factors and acceptance specifications and the Los Alamos Scientific Laboratory, Los Alamos, New Mexico on 3-14-56 for a meeting regarding chemical specifications and their effect on product quality.

R. C. Smith of Hanford visited the Dow Chemical Company, Rocky Flats Plant, Boulder, Colorado on 3-12-56 to discuss processing and fabrication techniques and the Los Alamos Scientific Laboratory, Los Alamos, New Mexico on 3-13 and 3-14-56 to discuss processing and fabrication techniques.

C. E. Michelson of Hanford visited the New Brunswick, New Jersey National Laboratory, New Brunswick, N. J. on 3-5- and 3-6-56 to discuss analytical problems and the Oak Ridge National Laboratory, Oak Ridge, Tenn. on 3-7 and 3-8-56 to discuss analytical problems.

W. R. DeHollander of Hanford visited Seattle, Washington on 3-8 thru 3-10-56 to present a talk to the Seattle, Tacoma Printers Association.

F. J. Leitz of Hanford visited the University of California, Berkeley, Calif. on 3-11 and 3-12-56 for technical recruitment.

DECLASSIFIED

ORGANIZATION AND PERSONNEL

	February	March
Separations Technology General	2	2
Plant Processes Sub-Section	64	64
Chemical Development Sub-Section	79	78
Chemical Research Sub-Section	61	59
Contact Engineering Unit	2	2
Analytical Laboratory Unit	34	34
Technical Shops Unit	28	28
	270	267

Plant Processes Sub-Section: R. E. Van der Cook, Engineer II transferred into the Sub-Section on 3-19-56 from Chemical Development. R. E. Walton, Engineer I terminated on 3-15-56 to work for the AEC at Arco, Idaho. W. S. Figg, Engineer I transferred on 3/1/56 to the Pile Technology Section.

Chemical Development Sub-Section: J. L. Carroll, Engineer II was reactivated on 3-12-56. R. E. Van der Cook, Engineer II transferred to Plant Processes on 3-19-56.

Chemical Research Sub-Section: E. M. Kinderman, Sr. Scientist terminated on 3-2-56 to do research work for the University of Stanford.

Analytical Laboratory Unit: Martha H. Buckner, Engrg. Asst. and Frances A. DeMers, Engrg. Asst. transferred into the Unit on 3-12-56. D. J. Criswell, Engrg. Asst. and J. S. Holmgren, Engrg. Asst. transferred to Analytical Control Sub-Section and Radiological Records and Standards Section on 3-12-56.

DEL

PLANT PROCESSES SUB-SECTION, O. F. HILL

REDOX PROCESS TECHNOLOGY

Summary

A new flowsheet for processing high MWD/T metal (expected to start about April 9) was issued as HW-42180. The new flowsheet incorporates revisions designed to eliminate potential critical mass problems in two phase systems in the plutonium cycle feed tanks.

The second stage of waste backcycle was incorporated on March 9, but was temporarily discontinued less than three days later due to in-cell piping trouble. Following the correction of the trouble, however, two stage backcycling was resumed on March 13, and was continued successfully without interruption for the balance of the month. The permanganate feed oxidation procedure was retained through the entire month.

Over-all fission product decontamination was excellent for uranium throughout the month; while decontamination of the plutonium dropped markedly, it remained adequate. Following the incorporation of the second stage of waste backcycle, acidity control of the intermediate feed streams was difficult and erratic. Largely as a result of this loss of control, the normal preponderance of the zirconium-niobium fission product contaminant gave way to ruthenium which became the only fission product of any importance in both the uranium and plutonium streams. The net result was essentially no change in the over-all uranium decontamination, but a loss of about a factor of ten in the over-all plutonium decontamination, the logarithmic dF averaging approximately 7.3 for the month.

Uranium product solution from the Purex Plant, having an average gamma ratio of about 20, was reprocessed through Redox in an equivolume blend with virgin material at a combined processing rate equivalent to 120 per cent of Phase II capacity. This was accomplished in a period of approximately two weeks (from March 3 to March 18) with no difficulties and with no adverse effects. The remainder of the Purex plutonium product was also reprocessed through Redox early in the month but, by the end of the report period, additional Purex plutonium product was being received for rework following the restarting of the Purex process.

Solvent extraction waste losses were very low for the month, averaging less than 0.1 per cent for uranium and plutonium across head-end and first and second cycles. However, due to a number of unusual circumstances such as the plutonium concentrator failure, the over-all losses were higher than usual. The over-all recoveries of plutonium and uranium were 99.38 and 99.69 per cent, respectively.

The average exposure of the metal charged to the dissolvers was 247 (241 to 261) MWD/T, and its average cooling time was 119 (107 to 136) days. Concentrated plutonium product ranged from 83.2 to 106.0 grams of plutonium per liter, with an average of 93.4 grams per liter, and the average concentration of nitric acid was 5.05 molar in this final plutonium product.

DECLASSIFIED

Feed Preparation

Following the completion of the Redox piping for the necessary transfer routing, Purex uranium product solution was blended with an equal volume of virgin metal solution in the oxidizer vessel before permanganate head-end treatment. This was continued for a period of approximately two weeks, during which the combined processing rate was maintained at 120 per cent of Phase II. Only two of the three dissolvers were used during this period.

No difficulties were encountered other than the lack of complete dissolution of the MnO_2 formed in oxidation, which resulted in a three day period of "scavenging" in the feed centrifuge. This occurred during a period when no Purex plutonium rework or Z Plant recycle was being processed (due to mechanical failure at the Recycle Hood unloading station), but was overcome by an increase in the amount of chromic nitrate used for the dissolution step. The amount of permanganate used was subsequently reduced by one-third also.

Decontamination

Following the incorporation of the second stage of waste backcycle (2DW concentrated and returned to the IA and IS Columns), the control of the acid concentration in the feeds to the second and third uranium extraction columns was generally poor and quite erratic. As a result, the fission product contamination in these streams rose by factors of from five to ten. The losses in decontamination, however, were compensated for by corresponding increases in the decontamination across the third uranium cycle, the net result of which was no change in the final uranium product gamma ratio. This produced exceptionally high decontamination factors across this cycle, which occasionally exceeded 250 (logarithmic dF = 2.4) in some individual cases. The average logarithmic decontamination factor for uranium was about 6.7 for the month, compared with the previous month's 6.8.

The shift in uranium decontamination was accompanied by a significant drop in plutonium cycle decontamination, affecting the final cycle particularly, and was evidenced by a drop in the average over-all logarithmic decontamination factor to 7.5 from the previous month's 8.2.

Analysis of some of the samples showed that the fission product appearing in the streams was almost entirely ruthenium rather than the normally expected zirconium-niobium couple. This seems to indicate that second stage backcycle has produced a shift (in opposite directions) of the "normal" decontamination for these two principal contaminants. Near the end of the report period, the amount of permanganate used for head-end oxidation was again increased (see above section on Feed Preparation), and preliminary results at the time of this writing indicate an improvement in decontamination, although it is not possible as yet to decide whether this is due to acidity control or the change in oxidation procedure.

Solvent Extraction

Second stage waste backcycle was begun shortly after the first of the month, but was temporarily discontinued when an in-cell piping leak from the backcycled waste concentrator cooling coil was found to have flooded the cells with water. When backcycling had been reestablished, the flow of salt to the IA and IS Columns as IAS and ISS was discontinued, and the concentration of the scrub stream to the second cycle extraction column (2D) was increased approximately 45 per cent to allow more flexibility in the operation of the 2D Column which, in turn, permits compensation for errors or malfunctioning of the D-14 waste concentrator. No adverse effects have been noted.

The flow of organic to the 2A Column was decreased by about 15 per cent (the L/V was thus raised from about 1.15 to 1.35) to reduce the load on the 2B (stripping) Column.

The flow of IC Column strip solution was increased by about eight per cent in an attempt to make the column more uniform with respect to the amount of nitric acid salted into the ICW and thus, in turn, permit a more uniform control of acid concentration in the feed to the final uranium cycle. It is not yet known whether any benefit has been derived from the change.

Waste Losses

Over-all recoveries of plutonium and uranium were satisfactory for the month, the net losses being 0.62 and 0.31 per cent for plutonium and uranium, respectively. A portion of the plutonium loss (which was approximately double that for February) was due to the failure of the final plutonium concentrator as explained last month and to the flushes following the shutdown on February 25, 1956. A large share of the balance was due to an error which permitted operation of the first cycle extraction column with a scrub stream flow of only about 60 per cent of normal for a rather long (but undetermined) period of time. For the remainder of the report period, solvent extraction losses were highly satisfactory, averaging less than 0.1 per cent for both uranium and plutonium across feed preparation and first and second cycle extraction.

Due to rather wide variances in previous operation and waste loss data, it is not yet possible to say definitely that the second stage of waste backcycle has succeeded in reducing waste losses in general, but preliminary indications are that over-all plutonium recovery may have been improved.

Plutonium Concentration

The plutonium concentrator heat exchanger which failed unexpectedly on February 25, was replaced with a Redox spare made of 304-L stainless steel on February 28. Visual inspection of the failed tube bundle revealed:

(1) The tube sheets showed some general corrosion but were, in general, all right.

DECLA[redacted]

(2) There were heavy deposits of scale in the upper ends of the tubes.

(3) There was a small amount of corrosion in the weld-sensitized zones of most tubes.

(4) There was a rather deep longitudinal depression in one tube.

It was concluded that the failure was due to some unseen mechanical or structural defect, such as an imperfect weld, rather than to general corrosion.

A prototype exchanger fabricated of titanium has been ordered by the Plant Processes Sub-Section to be tested in plant service. Studies performed by the Chemical Development and Metallurgy Sub-Sections indicate that this material of construction is absolutely safe under the service to which it is to be subjected. No indication of explosive characteristics has been indicated with a titanium heat exchanger under 60 per cent nitric acid service.

Following the installation of the third heat exchanger, the concentration of iron in the final plutonium product averaged about 60,000 parts per million parts of plutonium for about ten days. However, a rather sharp increase was then noted and, for the final week of the report period, the iron concentration averaged nearly 110,000 parts per million.

Due to steam trap trouble in the concentrator, most of the product solution produced for the final week of the report period was more dilute than normal, averaging about 85 grams per liter.

PUREX PROCESS TECHNOLOGY

Summary

The Purex Plant was started up on March 19 at a capacity factor of 1.44, with essentially the same flowsheet conditions existing as at plant shutdown in February. The startup was excellent, and general process performance since startup has been similar to that previously experienced. During steady-state operation, recovery of plutonium and uranium has been excellent. Plutonium decontamination across solvent extraction has been five fold below specifications, but concentrated product has met shipping specifications. Uranium decontamination across solvent extraction has been ten fold low but is improving at month end. During the first two days of operation, both the HA and IO Columns were flooding. Flooding of the HA Column resulted in the loss of approximately 500 units of plutonium. Flooding of the IO Column resulted in poor uranium removal from the IOF, thus permitting uranium contamination of the first several batches of plutonium. Approximately 5000 units of plutonium removed from the plutonium concentration equipment during the shutdown and 12,000 units of plutonium high in uranium content have been recycled to the HAF for recovery. The prototypical silica gel facility for uranium product decontamination was placed in operation on March 10, and zirconium-niobium decontamination factors of approximately six were achieved for uranium processed through the unit.

Feed Preparation

Irradiated uranium slugs having an average exposure of 249 MWD/T and cooled an average of 157 days since pile discharge were dissolved in A3 and B3 dissolvers. Iodine-131 reaching the stack during the period was consistently less than 0.01 curie per day.

At the startup of the plant, the metal solution storage tanks were essentially full, and dissolving did not start until March 21. Dissolving procedure changes aimed at maintaining a maximum temperature of the heated off-gases to the silver reactors have been somewhat successful. The lowest heated off-gas was 150 C with one to three tons heels, whereas this temperature dropped to 120 C with nine ton heels. However, the dissolving cycle was increased approximately one to two hours by this reduced heel technique. After nitric acid addition meters were installed, the dissolver procedure was changed to utilize a 43 per cent nitric acid for initial dissolving with the dissolver brought to a boil as rapidly as possible. When boiling was reached, 50 per cent acid was added continuously to the dissolver at a six to seven gallon per minute rate until the complete acid addition was made. Lowest heated off-gas temperature reached with this procedure is 160 C, and the dissolving time cycle has not been changed over the original dissolving procedure.

Solvent Extraction

The Purex Plant was started up on March 19 at a capacity factor of 1.44 with essentially the same flowsheet conditions existing as at shutdown on February 20. In general, the startup was excellent, especially when conditions existing in the plant at startup time are considered. In addition to the numerous minor difficulties experience, only two major problems extended over the first several days of operation, HA and IO Column flooding, which are discussed below.

For the first two days of operation, the HA Column flooded intermittently, probably as a result of recycling siliceous materials to the HAF along with the 5000 units of plutonium removed from the plutonium concentration equipment during the shutdown. As a result of this flooding, approximately 500 units of plutonium were lost to the waste. After the first two days of operation, the Precycle columns were operating very smoothly with satisfactory performance, decontamination factors above 1000 and waste losses below 0.1 per cent.

Excellent partitioning of the uranium and plutonium has continued to be achieved in the Partition Cycle. The ferrous ion content of all the plant solutions remained stable throughout the extended shutdown period, and plutonium losses to the uranium stream (IBU) averaged 0.02 per cent. Uranium contamination of plutonium was high (up to twelve per cent uranium in plutonium) after startup because of inadequate uranium removal from recycled organic, IBS and 2AX, caused by IO Column flooding. Approximately 12,000 units of plutonium were recycled to HAF for removal of excess uranium. However, uranium separation from plutonium in the IBS Column has been satisfactory since the organic has been adequately washed of uranium. Both uranium and plutonium recovery have been greater than 99.9 per cent. The startup flowsheet for the IA Column was a low acid flowsheet adopted on a test basis last month:

DECLASSIFIED

Stream	Flow*	Composition
IAF	75	U - 3.58 lb/gal HNO_3 - 0.26 lb/gal
IAX	382	30% TBP in Shell E-2342
IAS	56	HNO_3 - 1.05 lb/gal

* Flows based on Purex Plant Flowsheet I (HW-40574) HAF = 100.

In addition, the new IA Column pulse generator (having a 1.8 inch stroke), installed during the shutdown, has been employed to permit a 25 per cent higher amplitude-frequency product in the column. The initial IAF/2AF decontamination factor of 30 under these conditions was four fold higher than previously attained, and the IAF/2DF decontamination factor did not increase significantly until after the IC Column operating conditions were modified:

(1) ICX temperature reduced from 40-50 C to 20-30 C.

(2) IC Column pulse frequency reduced 20 cycles per minute.

(Similar changes have also been made for the HC and 2E Column flowsheets and, in addition, the extractant to feed ratios for these columns were reduced from 2:1 to 3:2.) Approximately a two fold increase in IAF/2DF decontamination factor was then evident.

The Final Uranium Cycle flowsheet remained on the ORNL No. 3 flowsheet summarized below:

Stream	Flow*	Composition
2DF	72.8	U - 3.66 lb/gal HNO_3 - 0.45 lb/gal
2DX	324	30% TBP in Shell E-2342
2DS	28.5	Demineralized water
2DIS	28.5	HNO_3 - 1.57 lb/gal

*Flows based on Purex Plant Flowsheet I HAF = 100.

Although a marked improvement from a decontamination factor of five to twenty was noted when this flowsheet was adopted in February, its performance during the first week of operation has indicated only a factor of five to ten maximum. This loss of efficiency may be ascribed to a solids problem or the fact that the flowsheet performs better when the previous cycle is high acid (rather than low acid). Further evaluation is necessary.

The Final Plutonium Cycle flowsheet remained essentially unchanged from the double scrub flowsheet adopted last month. The initial decontamination factor for this flowsheet was ca. 1000, but, following a few days' operation, the factor dropped for an unknown reason to 100. It is believed the excess activity in the

IBS and 2AX may be responsible for this effect. The activity of the 2BP plutonium product continues to be essentially five fold above specification but, with a comparable decontamination factor across the concentration equipment, PR cans have met shipping specifications for 234-5 Building operations. There has been no evidence of activity buildup in the lower ends of the concentration equipment, based on daily CP meter readings of the equipment activity. There is evidence of solids in the PR cans and solution, and iron corrosion has trebled since initial figures. The solids contributing to the T-L3 Stripper to E-L4 Concentrator line plug last month were found to be a combination of plutonium polymer, silica, iron, and phosphate ion, with silica being perhaps 50 to 75 per cent of the solids (see 234-5 Development, below). The equipment was flushed with four boiling 30 per cent nitric acid flushes to remove solids, and approximately 5000 units of plutonium were removed.

Waste Concentration and Acid Recovery

Both the No. 1 and No. 2 Acid Waste Concentrators are now being automatically controlled by a system similar to the uranium concentrators, utilizing specific gravity of pot bottoms to control steam to the tube bundles. Control has been excellent. The IWW volumes have been reduced to and maintained at approximately the flowsheet value for the first extended period since startup of the plant, probably as a result of the low acid flowsheets plus improved concentrator control. On March 21, the high activity waste was diverted from 101-A to 102-A Waste Storage Tank in 241-A Tank Farm. Tank 101-A is approximately 40 per cent full and gradually cooling since the February shutdown.

Organic Treatment

With the exception of the IO Column flooding at startup (which required column flushing to alleviate difficulty), both the No. 1 and No. 2 Organic Treatment Systems were operated with little difficulty. Organic losses were excessive (7000 gallons lost) during the shutdown and first two days of operation, and they continue to be three fold above last month's loss figure of 0.2 per cent of throughput. During the four week shutdown, the activity of the solvent decreased from 3000 to 500 microcuries per gallon. Attempts will be made to keep the solvent activity at a lower value during operation.

Silica Gel Tail-End

The prototypical silica gel facility was placed in operation on March 10 by processing uranium product having a fission product gamma ratio of six. Product activities of one fission product gamma ratio (both feed and product being 30 per cent ruthenium and 70 per cent zirconium-niobium) were consistently produced, permitting shipment of the uranium solution directly to the UO_3 Plant. Subsequent operation showed feed gamma ratios of 20 to 25 being reduced to five gamma ratio (12 per cent ruthenium and 88 per cent zirconium-niobium). This solution will be reprocessed through silica gel.

DECLASSIFIED

URANIUM RECOVERY PROCESS TECHNOLOGY

Summary

During periods of good steady-state operation, over-all plant losses were approximately 0.7 with 0.5 per cent of the total contributed by the solvent extraction columns. Several process upsets were encountered during the month. Most of these were attributable to difficulties in the RAX flow control system (air leaks in jumpers and control valves). A month's end, these difficulties are recurring (present RAW losses two to three per cent), and a shutdown for RAX control valve replacement is scheduled in the immediate future. The process upsets and occasional shutdown and startup periods associated with the RAX system difficulties adversely affected decontamination. Although in good control at month's end (uranium product fission product activity approximately 100 per cent aged natural uranium gamma activity), product fission product gamma activity averaged approximately 170 per cent aged natural uranium gamma activity for the month.

Solvent Extraction

The first cycle processed a slurry-rich feed containing uranium irradiated to about 200 MWD/T and aged from 15 to 21 months since pile discharge. RAW losses were consistently low during steady-state flowsheet operation, averaging 0.2 per cent of the virgin uranium processed.

Stripping losses were consistently below 0.1 per cent of the feed uranium when the RC and RE Columns were operated at steady-state conditions with the desired extractant flows. The REW losses did not vary significantly when, at a volume velocity of about 625 gallons per hour per square foot and a pulse frequency of 70 cycles per minute, the REX flow was decreased over a seven day period from 85 to 70 per cent of the flowsheet rate.

Gamma decontamination performance was affected adversely by solvent extraction system upsets. The average first and second cycle gamma decontamination factors were 310 and 120, respectively. The fission product gamma activity of the decontaminated uranium was 1.7 times that of aged natural uranium.

Addition of disodium acid phosphate to the second cycle acid scrub (RDIS) was continued at nominal scrub phosphate concentrations of zero, 0.05, 0.10, 0.15, and 0.20 M. The average REU gamma activity varied inversely with the scrub phosphate concentration and decreased from 130 to 80 per cent of aged natural uranium activity as the nominal phosphate concentration was increased from zero to 0.2 M. The product sodium concentration also varied significantly with the scrub phosphate (sodium) concentration. Residual REU sodium concentrations of 50 parts per million, increased to 90 parts per million when the scrub phosphate ion concentration was 0.2 M. There was no significant variation of RDW uranium loss with the scrub phosphate ion concentration employed. The test will be continued to substantiate the data now available.

[redacted]

DEL

The single element test "Fulflo" filters in the plant RAS (demineralized water) and RDIS (acid scrub) lines were tested using elements of nominal eight micron pore size. The RAS filter performance was not significantly different from that obtained when 20 or 30 micron elements were used. About 70,000 gallons of water were filtered before plugging occurred. The RDIS filter processed 3000 gallons before plugging, about half the volume required to plug the 15 micron element tested previously. The eight micron ROS filter element has not yet been evaluated. Filter testing will continue so that replacement elements of optimum pore size may be specified for the three large plant filters currently being procured.

The RCU organic decanter was installed in Tank 4-1. Its efficiency has not yet been determined.

Waste Treatment

Scavenging operations in the 221-U Building continued in good control throughout the month, using both nickel ferrocyanide and strontium phosphate scavengers. The cesium-137 and strontium-90 concentrations remaining in the settled supernatant averaged 0.032 and 0.026 microcuries per milliliter, respectively. The phosphate ion concentration averaged 0.07 M in the cribbed supernatant (desired concentration is 0.1 M). In spite of the low phosphate ion concentration, excellent soil retention of both cesium and strontium was obtained (i.e., greater than three column volumes of supernatant were passed through the test column without breakthrough of either cesium or strontium).

Soil column tests on the scavenged supernatant of the third tank of TBP Plant waste processed at the CR (in-farm) facility indicated breakthrough of both cesium and strontium in less than one-half column volume. This tank of concentrated TBP Plant waste was originally stored on top of a heel of bismuth phosphate process concentrated first cycle and coating waste and, therefore, contained a low concentration of aluminum ion (0.002 M). To determine the effect such aluminum ion concentrations would have upon soil retention of cesium and strontium, a sample of 221-U Building scavenged waste (TK-25-110-BY) which had exhibited excellent soil retention properties was spiked with aluminum to 0.004 M and again tested in a soil column. Soil retention was markedly reduced. Where originally at least three column volumes of supernatant could be routed to the soil column without cesium or strontium breakthrough, with the aluminum spiked sample less than one column volume of supernatant produced breakthrough of cesium and strontium. Incomplete laboratory studies indicate that the minimum aluminum concentration which can be tolerated in the supernatants cribbed is 2×10^{-5} M. Laboratory studies are currently in progress to determine whether this threshold aluminum concentration can be obtained by: (1) precipitation; (2) use of complexing agents; and (3) dilution with other cribbable wastes.

REU Gamma Monitor

The glass sample cell of the REU gamma monitor was replaced with a fluorothene lined glass sample cell in an effort to provide the monitor with a sample cell that would have more stable "background" characteristics.

DECLASSIFIED

The sample cell was unsatisfactory, however, as the lining came loose from the sample cell wall, creating an even more unstable background condition and plugging the outlet connection from the cell. The fluorothene lined cell was replaced with a straight glass unit and, to date, the operation of the monitor has been excellent, with the laboratory analyses of batch samples falling within 20 per cent of the average value recorded by the monitor during the production of the batch sampled.

URANIUM CONVERSION PROCESS TECHNOLOGY

Process

The following pertinent average data obtained on the last ten car block of UO_3 produced during the month reflects the excellent quality that was maintained on the product during the month.

(1)	Total Metallic Impurities	180 parts per million parts of uranium
(2)	Fission Product Gamma Activity	75 per cent that of aged natural uranium gamma activity
(3)	Reactivity Ratio	1.1 (0.05 weight per cent sulfamic acid additive)

Three carloads of product produced during the month were very slightly below the 40 mesh particle size specification. These cars were shipped on the basis of a waiver by the customer. Cleanout of the accumulated caked powder from the cyclone separator apparently eliminated the problem.

Mechanical difficulties with the agitators and flame control systems on the Luckey pots continue to hamper the output of these calciners. However, time cycles averaging between eleven and twelve hours have been attained during periods of uninterrupted operation.

Tests

Recent studies showed that a 30 minute cooling period following the completion of electric pot calcination is necessary to prevent nitrous oxide fumes from escaping into the pot room atmosphere during the unloading period. Preliminary indications also show that, although it is a little more difficult to unload the relatively cold powder following a 30 minute cooling period, the life of the unloading exhauster filter bag is increased.

Z PLANT (ISOLATION, PURIFICATION, AND FABRICATION) PROCESS TECHNOLOGY

Purex Coupling

The gamma activity of metal produced from Purex feed material can be predicted from the gamma activity of the feed material no closer than within a factor of

DECLASSIFIED WITH DELETIONS

DEL

two. The poor precision of this correlation is probably due to:

(1) Non-homogeneity of the Purex product within a sampled batch.

(2) Varying decontamination of the product in Z Plant processing.

(3) The poor precision in the gamma determination within the range of activity encountered.

A sampling program has been initiated, and all metal processed is being monitored in an attempt to obtain a better insight into the radiation problem.

Hydrofluorination (Task II)

A furnace door ejection, accompanied by a ball of fire and the dispersion around the hood of burning particles, occurred during the hydrofluorination of a batch of plutonium "oxide". The oxide had been formed by the oxidation of plutonium chips from a machining operation, and probably contained finely divided metal at the centers of the powder particles, the metal causing rapid decomposition of the hydrogen fluoride and the formation of hydrogen. The process specification for feed material to Task II is being revised in an attempt to avoid encountering this type of situation.

Recuplex

Plutonium recovery operations in the Recuplex solvent extraction system were resumed on March 21, 1956, after a five week shutdown period for equipment

DECLASSIFIED WITH DELETIONS

maintenance and a three week cleanout period for conversion to low MWD/T material. The maintenance program was directed toward minimizing the use of neoprene gloves in the SE Process Hood for valve maintenance and vessel sampling, as discussed in the January report (HW-41205-H). The extended period required for cleanout of the high MWD/T plutonium may be largely attributed to two factors:

(1) The gross amounts of plutonium (approximately 30 per cent of the total inventory) which had accumulated on the hood floors after the previous failures of G. W. Dahl valves.

(2) The high plutonium recycle to the feed, which resulted from inefficient operation of the steam-stripper and the frequent need for solvent treatment.

These factors are amenable to mechanical and technological improvements. Based upon the fact that cleanout of the SC Process Hood and the solvent extraction system, per se, required approximately one (five day) week, it is estimated that future cleanouts of the total Recuplex system would require eight days.

Addition of nitrite to the Recuplex feed streams has been discontinued because of the detrimental effect the nitrite had on the solvent. Solvent degradation rates, as evidenced by buildup of unstrippable plutonium in the recycling solvent, were much increased by the nitrite. The solvent which had been exposed to nitrite containing feed was also more difficult to wash free of plutonium complexing degradation products.

234-5 DEVELOPMENT

Purex Product Coupling Studies

Continued studies of means to reduce the gamma activity of Purex PR solution have shown that a DF of three can be obtained using a silica gel column. Nine volumes of PR solution could be run through one volume of -40 +50 mesh silica gel at room temperature and up to twenty volumes at 60 to 70 C, with a flow rate of 2.5 to 5 cc/min/cm^2. No additional gamma decontamination was observed across an oxalate strike with the product obtained from the silica gel runs.

A DF of approximately three was obtained using Dowex 1 resin.

The addition of zirconium (10 mg/liter) added as the nitrate and heated for three hours, or Versene (0.005 M), or fluoride (0.1 M) resulted in DF's of 1.9, 1.6, and 2.3 across an oxalate strike.

The green, gummy solids filtered from Purex can P-2-20-98 (part of the material flushed from the plug between the stripper and concentrator) were converted quite rapidly to a slurry by boiling 16 M nitric acid or, more slowly, with boiling 8 M nitric acid. Approximately 25 per cent of the solids are dissolved by hot 16 M acid. Analyses of this solution reveals plutonium, iron, phosphorus, and silica, with traces of nickel and chromium. The plutonium to iron mole

ratio was 28.6. The iron to phosphorus ratio will be determined. The solids which did not dissolve in the hot acid were primarily silica, with no phosphorus, and only a small amount of iron detected.

Continuous Tasks I and II Prototypes

Three one kilogram runs were made this month in the prototype precipitation equipment. Instantaneous rates of one kilogram per hour were obtained successfully. Plutonium recycle losses were ca. three per cent, including startup. Observations made during these last three runs include:

(1) The agitation in the filter pan was insufficient in the earlier runs (ca. 80 cpm) to keep the dense plutonium oxalate slurry suspended sufficiently to be picked up on the rotating filter; hence, oxalate accumulated in the pan and the filtration rate on the rotary filter were less than the rate that the feed was added. An agitator frequency of 140 cpm was sufficient.

(2) With the improved agitation, a three inch wide Dynel SD-9 filter cloth was required to maintain instantaneous rates of a kilogram per hour.

(3) A ten minute residence in the reactor is sufficient.

(4) Simultaneous addition of both reactant and precipitant streams into the empty pan (a zero per cent startup) produces a slurry with more fines than the 15 per cent startup used in previous runs.

(5) Dynel SD-9 filter cloth will eventually deteriorate and blind. Deterioration occurred after the cloth had been in use for five runs and in position for two months. Blinding may be a result of the deterioration. Tests are being made to determine the cloth life.

The Task I continuous calciner prototype was successfully tested at a plutonium feed rate of one kilogram per hour. Analysis confirmed that the plutonium oxalate was completely converted to plutonium dioxide in two passes through the three foot calcination section. The measured cake temperature was 100 C while operating the furnaces at 400 C during the first pass. Some lumps were still present at the end of the first pass, but the material was 70 per cent calcined.

The measured cake temperature was 350 C while operating the furnaces at approximately 475 C during the second pass. The product was a free-flowing powder with the characteristic plutonium dioxide color. Visual inspection of the operation indicated that the plutonium oxalate had been 100 per cent calcined after traveling 5.5 feet through the six foot (two passes of 30 feet each) calcination section.

DECLASSIFIED

A total of five kilograms of plutonium was processed through the continuous Task II (hydrofluorination) prototype equipment. The plutonium dioxide to plutonium tetrafluoride conversion material balances indicate that essentially 100 per cent fluorination is obtained.

Continuous Task I Laboratory Studies

Continuous prereduction has been shown feasible. A starting solution of 90 g/l Pu (90 per cent Pu(VI)),5.2 M HNO_3, 43,000 ppm Fe, and 90 per cent over-all purity was completely reduced to Pu(IV) during a residence time of five minutes. A temperature rise of ca. 15 C was found.

One laboratory scale run was made to investigate the feasibility of continuously precipitating plutonium oxalate from 10 g/l plutonium, 1.0 M HNO_3 feed. Plutonium recycle was 0.5 per cent as measured with "M" sintered Pyrex. The slurry characteristic improved with time of operation as with a 90 g/l plutonium feed stream. The run was made by making a batch strike at 23 C and then proceeding with simultaneous addition of the plutonium and oxalic acid stream and with simultaneous slurry removal. A residence time of ten minutes was used. After two throughputs, the slurry settled rapidly and was readily filtered.

Continuous Plutonium Peroxide Precipitation

Laboratory scale continuous precipitation of plutonium peroxide was shown feasible for a feed stream containing sulfate. A precipitate formed in the absence of sulfate was not improved by continuous processing.

The batch and continuous precipitations were made at 20 C with a residence time of ten minutes for the continuous processing test. The first feed contained 50 g/l plutonium 100 per cent Pu(IV), 1.3 M nitric acid, and 0.05 M sulfate. A flow ratio of one volume feed to 0.30 volume of 50 per cent hydrogen peroxide was used. The quality of the continuously produced plutonium peroxide precipitate was improved over that produced batch-wise and settled rapidly and filtered easily. The recycle obtained after the batch startup was 1.5 per cent, and during continuous processing was 0.8 per cent.

A second feed with no sulfate (40 g/l plutonium, 1.9 M nitric acid) did not result in an improved slurry from continuous precipitation (four throughputs). A recycle loss of 2.5 per cent was obtained at startup and 1.3 per cent during continuous operation, as measured through an "M" sintered Pyrex funnel.

Recovery of Plutonium Turnings

The recovery of metal turnings included three attempts to bypass complete recycle of metal through the dissolution and process steps. To the first batch of pressed turnings was added calcium metal, and calcium chloride and calcium fluoride in a weight ratio of 60/40. The charge was loaded in a closed reduction vessel under an argon atmosphere, heated to 860 C and held there for an hour. The slag from this operation contained small metal beads in its lower

layer, but covered a button of approximately 600 grams. The second and third charges contained calcium chloride and calcium fluoride in the eutectic ratio and were heated at 1000 C for an hour. The slag contained no large metal beads and covered a well formed button. The recovery of plutonium from the slags and crucibles must be done in the laboratory due to the chloride bearing slag.

DECLASSIFIED
[redacted]

DEL

CHEMICAL DEVELOPMENT SUB-SECTION, R. E. SMITH

HOT SEMIWORKS

Five Hot Semiworks Purex Runs, PX-14 through PX-18, were completed during the month. The flowsheet variables tested were primarily those postulated to give increased decontamination in the HA and IA Columns. The following tentative conclusions have been reached from a preliminary analysis of the data available.

(a) A substantial increase (at least a factor of three) in the semiworks HA Column decontamination if observed whenever the organic holdup in the scrub section increases from 20-25% (normal holdup) to about 35%.

(b) The use of 2WW (believed to have contained waste system solids) as dissolver acid resulted in poor decontamination in the HA and IA Columns with a ten-fold increase in the gamma activity of the solvent.

(c) A three-to-four-fold improvement in IA Column decontamination was noted when the change was made from Purex HW No. 3 Flowsheet to the Purex Plant low acid flowsheet for the IA Column. (IAF = 1.8 M U, 0.03 M $NaNO_3$, 1.0 M HNO_3; IAS = 2.0 M HNO_3) Comparable IA decontamination performance was obtained, however, during PX-13 which was conducted under the high acid conditions.

(d) Decontamination in the HA and IA Column remained unchanged when processing either updraft or downdraft dissolved uranium.

(e) The addition of 0.0013 M "Versene" (ethylenediamine tetra acetic acid, or the tetrasodium salt thereof) to both the feed and scrub streams of HA and IA Columns increased the decontamination slightly (a factor of about two) with no detectable increase in plutonium loss. Addition of "Versene" to the IOS increased IO Column decontamination by a factor of 2.

A brief description of the more important run information is presented in the paragraphs below. Table I contains a tabulation of the performance data for the various runs.

Run PX-14

PX-14 was planned to operate (using HW #3 Purex Flowsheet except for the omission of sodium nitrite from the HAF and IAF) at the same conditions as PX-13 which met flowsheet decontamination specifications for U and Pu. The HAF, which had been dissolved prior to the maintenance shutdown and allowed to stand

a period of 4 weeks, was oxidized with $NaNO_2$. The $NaNO_2$ was destroyed by the addition of sulfamic acid and 0.5% sulfamic acid was added to both the HAF and HAS as well as the IAF and IAS to minimize decomposition of the solvent. Although operating conditions of PX-13 were maintained, the DF obtained in the HA Column ranged from 180 to 240. The HAF filter, installed during the last overhaul period to functionally replace the failed centrifuge, plugged after a short period of operation and had to be bypassed. The IAF/IAP decontamination factors continually decreased during the run to a low of 11 at shutdown.

Run PX-15

This run was a repeat of PX-14 using freshly dissolved HAF. When poor HA Column decontamination resulted from PX-14 run conditions, the HA Column frequency was increased from 70 to 92 cyc./min. While operating at a frequency of 92, the organic content of the scrub section was observed to have increased above that of normal operation. Coincidental with this holdup of organic in the scrub section, the gamma decontamination in the HA Column was improved by a factor of 3 to 4. Preliminary calculations indicate the organic content to have increased from the 20-25% normal holdup up to at least 35% (55-60% is flooding). Operation with the "loaded" scrub section was maintained by varying the HA Column frequency from 80 to 88. Near the end of the run a reduction in frequency "unloaded" the scrub section, and the DF returned to about 100, the value obtained during the first portion of the run.

Attempts made to improve the IA Column decontamination by "loading" the scrub section with organic were precluded by prior to flooding of the extraction section of the column.

Flooding was experienced in the 2A Column at plant equivalent production rates above 10 T./D.

Run PX-16

The HA Column scrub section was "loaded" with organic near the beginning of PX-16 and equilibrium operation produced a DF of 700 across the HA Column.

The IA Column was operated on the Purex Plant low acid flowsheet (IAF = 1.8 M U, 1.0 M HNO_3, 0.03 M sodium nitrite; IAS = 2.0 M HNO_3). Addition of 0.0013 M "Versene" to the IAS during the latter part of the run increased the DF from 100 to a maximum of 160. No increase in the IAW plutonium concentration was detected as a result of the "Versene" addition.

DECLASSIFIED

Run PX-17

Recycled 2WW was used as acid for dissolving irradiated slugs in order to recover plutonium collected in the No. 2 Waste Concentrator. HA Column decontamination factors with the scrub section "loaded" were 220 on the first three dissolver cuts which utilized 45% of the required acid from 2WW. This value was increased to 400 by the addition of 0.0013 M "Versene" to the HAF and HAS. During the period of operation on the fourth dissolver cut which was made entirely with 2WW, the HA Column DF declined steadily to a low of 60 at the end of the run with "Versene" present in the feeds.

The dissolver solution prepared for this run was pumped directly into the column without clarification after adjustment to HAF specifications. A white flocculent precipitate was found in some of the HAP samples obtained late in the run. This material, as yet unidentified, appeared to contain the majority of the activity. The decreased decontamination in the HA Column resulted in extremely high radiation readings on the HAP samples.

Operation of the IA Column remained steady during the entire run. The IAS contained 0.0013 M "Versene" throughout. Increasing the temperature of the IAF from 30 to 60°C. decreased the decontamination obtained in the IA Column by about 40%.

Run PX-18

The first two dissolver cuts, made by updraft dissolving, were processed separately through the HA Column. Various attempts were made to "load" the scrub section with organic but each time a flood developed in the extraction section; consequently, the run was made without a "loaded" scrub section. No discernible effect on either HA or IA Column decontamination could be attributed to the change from updraft dissolved solution to downdraft dissolved material.

The addition of 0.0013 M "Versene" to the IAF and IAS increased the IA Column decontamination slightly when processing downdraft material. Treating the solvent with IOS containing 0.001 M "Versene" prior to the addition of "Versene" to the IA Column feeds had no apparent effect on IA Column decontamination.

DECLASSIFIED

TABLE I

HOT SEMIWORKS RUN DATA[a]

Solvent: 30% TBP - 70% Shell E-2342
HA Column amplitude = 1.07 in.; IA Column amplitude = 1.2 in. (extraction section)

	PX-14	PX-15	PX-16	PX-17[b]	PX-18
Dissolver HNO_3 Consumption					
M HNO_3/M U	2.7-3.2	2.6-3.0	2.8-3.0	2.8-3.9[c] (2.6)	5.44[d] 2.84
HA Production Rate					
(Plant T/D equivalent)	14	14	14	14	14
HA Frequency	76	70 - 92	76 - 82	80 - 96	86 - 90
HAF/HAP dF	2.3-2.4	2.0-3.0	2.8-3.2	2.3-2.6[f] (1.8)	2.1-2.7[d] 2.2-2.7
HAW% Pu	0.02-0.3	0.2	0.2	0.07	0.08-3.5
HAW% U	0.07	0.03	0.3	0.04	0.1-3.0
HAF/IAF dF	2.2	2.3	2.5-2.7	2.5 (1.8)	1.9-2.4
IA Production Rate					
(Plant T/D equivalent)	14	10-20[g]	14	14	14
IA Frequency	68	56-74[g]	54-60	56	56
IAF/IAP dF	1.1	1.0-1.3[g]	2.0-2.1[h]	1.7	1.8
IAW% Pu	0.6	~1	0.06	0.02-0.08	0.02-3.0
IAW% U	0.01	~1	0.01	0.003-0.001	0.002-0.2
IBP% U	2×10^{-3}	5×10^{-3}	2×10^{-3}	2×10^{-3}	7×10^{-3}
IBU% Pu	0.3	0.4	0.4	1.4	1.3
IAF/ICU dF	2.0-3.1	2.9	2.6-2.9	2.7	2.6-2.9
IAF/2AF dF	1.5	1.5	2.1	2.4	1.8-2.0
2AF/2AP dF	2.2	2.3	2.3	1.8	2.0-2.3
2AW% Pu	0.6	3	0.6	1.0	.04-1.7
IOF/IOO dF	1.0-1.5	1.3	1.1	0.9 (0.3)	1.0-1.3[j]
Gamma activity in IOO					
μc./gal.	30	30-60	85	700-2500[i]	110-190
Overall dF HAF/ICU	4.3-5.3	5.1	5.4	4.8	4.6-5.1
Overall dF HAF/2BP	5.8-6.3	6.2	7.2-7.8	6.6	6.0-6.7

Notes: See following page.

DECLASSIFIED

DEL

Notes:

(a) Data shown are taken from periods of stable operation. Downdraft dissolving was used except as noted.

(b) Data in parenthesis refer to the 4th dissolver cut.

(c) Cuts No. 1, 2, and 3 used 55% fresh acid - 45% 2WW acid. Cut No. 4 utilized 100% 2WW acid.

(d) Updraft dissolving data.

(e) DF's increased from 100 to 1000 when the scrub section became loaded with organic.

(f) Decontamination factor during final period of operation dropped as low as 1.4.

(g) Production rate and frequency were increased in an attempt to load the IA Column scrub section. DF increased up to 70 at high production rate.

(h) Addition of 0.0013 M "Versene" increased IAF/IAP DF from 100 to an average of 140.

(i) A rewash of the IOO with IOS containing 0.001 M "Versene" reduced the activity to 250 μc./gal. with a DF as high as 85.

(j) The solvent inventory of the system was changed after PX-17.

PUREX DEVELOPMENT

Process Chemistry

Miniature Pulse Column Runs Simulating IA Column Conditions. A series of miniature pulse column runs simulating Purex IA Column conditions was made to determine the effect of scrub acidity, solvent quality, digestion of feed, presence of "Versene" in the IAS, and excess extraction section capacity on fission product decontamination, uranium and plutonium recovery, and general column operability, i.e., dispersion and coalescing characteristics. The column (10 mm. in diameter, with eight-inch extraction and scrub sections) was operated under HW No. 2 Flowsheet conditions at a volume velocity of 100 gal./(hr.)(sq.ft.). The IAP's produced were batch stripped to produce corresponding ICU's. Results obtained for these runs are tabulated below.

MINIATURE PULSE COLUMN RUNS - IA COLUMN CONDITIONS(1)

Run No.	Run Conditions	Feed	Solvent	Gross Gamma Decontamination Factor IAF-IAP	Gross Gamma Decontamination Factor IAF-ICU
1	Standard (HW-No. 2)	Purex IAF (2-15-56 Gross γ = 6.36 x 10^4 μc/gal.)	Laboratory	29	43
2	IAS = 3 M $NaNO_3$	Same as 1	Same as 1	49	97
3	Standard	HSW IAF (3-5-56 Gross γ = 6.71 x 10^5 μc/gal.)	HSW IOO (3-5-56 Gross γ = 19 μc/gal.)	32	49
4	IAS = 3 M HNO_3-0.0015 M Versene	Same as 3	Same as 3	328	410
5	Same as 4	Same as 3	Purex IOO. (3-1-56 Gross γ = 520 μc/gal.)	230	559
6	Standard	Same as 3	Same as 5	< 50	< 94
7	Standard	Same as 1	Same as 5	19(2)	32
8	12-hour reflux of feed prior to run.	Same as 1	Same as 5	43	57
9	Simple column. Eight-inch extraction section.	Same as 3	Same as 5	15	35
10	Simple column. Sixteen-inch extraction section.	Same as 3	Same as 5	6	13

Notes: See following page

DECLASSIFIED [redacted]

Notes:

(1) In all runs the uranium loss to the IAW was about 0.1 per cent and the plutonium loss averaged five to ten per cent. Gamma scans of the feed solutions indicated the radioactivity to be >95% Zr-Nb. Column operability appeared to be independent of the variables tested, including the addition of "Versene" to the IAS.

(2) An additional DF of four was obtained by a single two-minute batch contact with 1/5 volume of IAS.

The use of a neutral scrub solution (3 M $NaNO_3$ vice 3 M HNO_3) appears to increase the gross gamma DF by a factor of two (Run 2). Approximately the same increase was attained by a 12-hour reflux of the acid feed at 100°C. (Run 8). An eight to ten-fold increase in the gross gamma decontamination factor was obtained by utilizing a IAS containing 0.0015 M "Versene" - 3 M HNO_3 (Runs 4 and 5). No adverse effect on column operability due to "Versene" was observed. Increasing the length of the extraction section from eight to sixteen inches (operated as simple columns) resulted in a three-fold decrease in feed point DF (Runs 9 and 10). Under the conditions used in these runs, about four inches of extraction section reduced the uranium content of the aqueous phase to about one gram/liter. It is of interest to note that the DF obtained with an eight-inch column operated as a simple column was only two-fold lower than that obtained with a dual column consisting of eight-inch extraction and scrub sections (Runs 1 and 9). There is no evidence from these runs that plant solvent produces any significant decrease in overall IA-IC decontamination.

Ultracentrifugation of Process Streams. A program of centrifuging, at very high acceleration, samples of process solutions has been started to learn more about the role, in solvent extraction processes, of particulate matter carrying radioactive constituents. Nine 13 ml. samples, as tabulated below, were centrifuged for two hours at about 144,000 x G. Gross gamma activity of 1.5 ml. samples taken from the top and the bottom of the centrifuge tubes was determined. The ratio of bottom to top activity is tabulated.

Material Centrifuged	Gross Gamma Activity, Bottom Sample/Top Sample
(1) Purex IAF	1.1
(2) Zr tracer digested in 6 M HNO_3	1.2
(3) Zr tracer digested in 2 M HNO_3	1.2
(4) IAW from miniature pulse column run wherein Hot Semiworks IAF and IAX was used.	1.6
(5) As 4 except "Versene" in IAS	2.0
(6) HCP from HSW, 3-4-56	2.3
(7) HPC prepared from (6)	1.3
(8) (6) butted to 4.3 M HNO_3 and refluxed 20 hours.	1.0
(9) IAF prepared from (8)	1.2

No visible solids were present in any of these samples. The maximum ratio observed corresponds to migration of about ten per cent of the activity present. Further work involving ultracentrifugation of process streams followed by solvent extraction studies involving these streams is planned.

Batch Contact Studies. Aliquots of simulated HPC samples prepared from Purex IBXF and from Hot Semiworks HCP were butted with HNO_3 (to 6 and 4.3 M, respectively) and refluxed approximately 16 hours. Batch contacts simulating IA Column extraction and scrubbing were made using as feeds the refluxed HPC's and the same HCP's without reflux. For all cases, extraction and scrub gross gamma E_a^o values were about the same (0.01-0.02 and 0.15, respectively) indicating no benefit to decontamination derived from refluxing the feeds at high acidity. The extraction E_a^o values obtained correspond to a feed point gamma DF of about 25.

In single IAFS-IAX batch contacts in which the IAFS contained (1) no additive, (2) 0.02 M "Versene", (3) 0.02 M itaconic acid, and (4) 0.02 M gluconic acid, gross gamma distribution ratios of 0.02, 0.008, 0.0004, and 0.0002, respectively, were obtained. Itaconic and gluconic acids as feed or scrub additives will be evaluated further in miniature pulse column runs.

Stored IBFX Solution. Following the crash shut-down of the Purex Plant on February 23, about 4000 gallons of IBXF solution were held at 40°C. in contact with an aqueous phase of unknown composition. Batch contacts simulating Purex IB and IC Columns and using the stored IBXF as feed showed normal uranium partitioning and recovery. Solvent quality tests on simulated IOO prepared from the stored IBXF indicated the solvent to be comparable to Purex Plant IOO prior to the shut-down.

Solvent Quality. Solvent quality tests ("C" contacts, optical density, gross gamma after carbonate wash, dispersion and disengaging times, and multiple batch extraction-scrub-strip studies) are being made periodically on Purex Plant IOO in an attempt to detect any gradual deterioration in the solvent. To date, samples obtained on 2/9/56, 2/14/56, and 3/1/56 have been examined. Optical density, "C" contact values, and dispersion and disengaging times have remained essentially unchanged. In all three cases overall IA-IC gross gamma decontamination obtained in the batch contact tests was poorer than obtained with fresh solvent (a factor of three for the 2/9 and 3/1 and seven for the 2/14 samples). The significance of these variations in terms of Plant performance is not known.

"Versene" in IWW. Possible use of "Versene" (or other EDTA products) in Purex feed and/or scrub streams prompted investigation of the fate of this material in the waste concentrators. In refluxing synthetic IWW the concentration of EDTA decreased from an initial 0.004 M to < 0.0001 M within three hours. In two of the five runs made in which EDTA was present, a very small amount of an unidentified viscous material appeared on the surface of the refluxing IWW.

Head-End Studies. A series of head-end procedures previously studied primarily from the standpoint of ruthenium removal were reviewed (with modifications) to determine their effect on subsequent solvent extraction of fission products. Synthetic dissolver solution (2 M U, 0.1 M HNO_3) spiked with one per cent Redox dissolver solution was used as feed for these studies. Portions were "head-ended", made up to HAF composition, and contacted batchwise (1 extraction, 3 scrubs, three strips) simulating Purex HW No. 3 Flowsheet HA-HC Column conditions. Decontamination factors obtained are tabulated below.

DECLASSIFIED

Type of Head End	Volume Percent Precipitate	Gross Gamma Decontamination Factors (Arithmetical)				
		Head End	HA-HC	Extraction	Scrub & Strip	Overall Feed to HCP
None (Control #1)	0	0	530	80	6.6	5.3×10^2
.02 M CuS	1.7	1.3	1200	66	17	1.6×10^3
.02 M CuS, 10^{-3} % Separan	1.7	1.4	1100	56	20	1.6×10^3
.02 M CuS, .02% Separan	1.6	1.3	1360	85	16	1.8×10^3
.02 M CuS, 20 g/l Superfiltrol	5.4	8.2	1000	268	3.8	8.3×10^3
.02 M CuS, 20 g/l Superfiltrol, 0.02% Separan	5.8	4.9	2200	251	9	1.1×10^4
.025 M MnO_2 (Reverse Strike)	2.9	4.4	1300	90	15	6.0×10^3
.025 M MnO_2, 0.02% Separan	3.5	4.1	2200	110	20	8.9×10^3
None (Control #2)	0	0	1300	110	12	1.3×10^3
20 g/l Superfiltrol	3.7	3.3	2700	280	9.5	8.8×10^3
10 g/l Superfiltrol	2	2.6	1800	230	8	4.7×10^3
5 g/l Superfiltrol	1.5	2.0	1500	170	9	3.0×10^3
5 g/l Superfiltrol, .02% Separan	1.3	2.0	2100	260	8	4.0×10^3
1 g/l Superfiltrol	0.3	1.3	1000	130	8	1.3×10^3

Each head-end procedure (except for 1 g/l Superfiltrol) tried improved the HA-HC gross gamma decontamination factor over that for the corresponding non-head-ended control. Copper sulfide and manganese dioxide appear to improve scrubbing and/or stripping in the subsequent solvent extraction, while scavenging with superfiltrol appears to improve extraction decontamination. These studies will be extended to other head-end treatments and solvent extraction behavior of feeds so produced will be determined by miniature pulse column runs as well as batch contact studies.

Chemical Engineering Development

Pulse Column Studies

Scrub Section Studies. The program started last month to develop an improved cartridge for an A-type column scrub section was continued. Evaluation was made of the flooding and efficiency characteristics of several cartridges under scrub section conditions. The studies were made with both aqueous and organic phase continuous at processing rates of 10 and 20 tons U/day (Purex Plant basis). Efficiency studies were based on the transfer of chloride ion.

Fifty-six A-type column scrub section runs were made during the month in a 3-inch-diameter glass column with a 9-ft. cartridge. Purex HW No. 3 Flowsheet modified to include the addition of 0.5 M NaCl in the HAF was used throughout. Extensive investigation was made of the present plant cartridge (stainless steel sieve plates with 1/8-in.-diameter holes, 23 per cent free area, and 2-in. spacing) in an effort to determine the effect of pulse amplitude on flooding frequency and scrub efficiency. In addition the following cartridges were evaluated:

1. Stainless steel nozzle plates with 1/16-in.-diameter holes, 5 per cent free area, 0.03-in. nozzle depth, and 2-in. spacing.

2. Stainless steel nozzle plates with 1/16-in.-diameter holes, 0.026-in. nozzle depth, 10 per cent free area, and 2-in. spacing.

3. Fluorothene sieve plates with 3/16-in.-diameter holes, 23 per cent free area, and 2-in. spacing.

The results of the studies are presented in Tables II and III. Highlights of the findings are summarized below:

Standard Cartridge

1. For aqueous continuous operation, an increase in pulse amplitude resulted in an increase in the amplitude times frequency product required to produce flooding. Over a range of pulse amplitudes from 0.6 to 1.5 in. and volume velocities from 250 to 1000 gal./(hr.)(sq.ft.), sum of both phases, the flooding characteristics can be approximated within 10 per cent by the following equation:

$$VV_f = 1240 + 16.5\ (23.3a - af)$$

in which

VV_f = flooding volume velocity, gal./(hr.)(sq.ft.)
a = pulse amplitude, in.
f = pulse frequency, cycles/min.

DECLASSIFIED

2. Efficiency at a pulse amplitude of 0.6 in. and aqueous phase continuous was sharply frequency dependent at a volume velocity of 500 (20 tons U/day on a plant basis). Typical chloride H.T.U. values were 3.2, 2.8, 2.3, and 1.7 ft. at 70, 80, 90, and 100 per cent of flooding frequency, respectively. At a volume velocity of 250, the frequency sensitivity was not evident. Chloride H.T.U. of 1.5, 1.7, and 1.7 ft. were obtained at pulse frequencies of 100, 110, and 120 to 140, respectively. It was necessary to vary the frequency between 120 and 140 cycles/min. to maintain the column at an incipient flood point.

3. Operation at higher pulse amplitudes required a higher amplitude times frequency product to achieve an equivalent H.T.U. Correlation of H.T.U. against the per cent of flooding frequency revealed no significant difference between amplitudes.

4. At pulse amplitudes between 0.6 and 1.5 in., the dispersed phase holdup in the cartridge increased with increasing frequency. Between 40 and 90 per cent of the flooding frequency the holdup ranged between 13 and 25 per cent. Under all conditions tested the dispersed phase holdup increased sharply to 50 to 60 per cent at the flooding frequency.

5. The standard cartridge at a 0.6-in. pulse amplitude showed approximately the same flooding characteristics when operated with the aqueous or organic phase continuous. Chloride H.T.U. were about 10 per cent higher for the organic continuous operation.

Fluorothene Cartridge

1. Operation with a 1.0-in. pulse amplitude and the organic phase continuous resulted in a dispersed phase holdup of 10 per cent at pulse frequencies up to the flooding frequency. The efficiency was poor; H.T.U. ranged from 3.6 to 13 ft. at pulse frequencies between 80 and 100 per cent of flooding.

Nozzle Plates Cartridge

1. Nozzle plates had flooding characteristics which were less frequency sensitive than those of the standard cartridge. At a 0.6-in. pulse amplitude nozzle plate flooding frequency decreased 10 cycles/min. when the volume velocity was increased from 250 to 500. The standard cartridge flooding frequency decreased 30 cycles/min. for the same increase in throughput.

2. Nozzle plate cartridges had flooding frequencies approximately the same regardless of which phase was continuous. Both cartridges tested, however, exhibited a partial inversion when the aqueous phase was continuous, i.e., at pulse frequencies 20 to 30 cycles/min. below the complete flooding frequency one-half to two-thirds of the column would become organic continuous. This was not a cyclic condition since the operation appeared to be stable.

3. The 10 per cent free area nozzle plate cartridge showed similar flooding frequency-pulse amplitude characteristics to the standard cartridge. Increasing the amplitude from 0.6 to 1.0 in. increased the flooding amplitude times frequency product by about 10 per cent.

4. The efficiency of the nozzle plates with the organic phase continuous was not promising. At a volume velocity of 500 gal./(hr.)(sq.ft.), H.T.U. varied from 4.3 to 8.2 and 3.0 to 5.0 ft. for the 5 and 10 per cent free area plates, respectively.

5. At a volume velocity of 500 and aqueous phase continuous, an H.T.U. of 2.0 ft. was obtained. This is approximately the same as obtained with the standard cartridge.

DECLASSIFIED

TABLE II

PUREX 3-INCH HA SCRUB COLUMN FLOODING STUDIES

Flowsheet: Purex HW No. 3, F.P.'s omitted, NaCl added to HAF.
Diluent: Shell E-2342.
Equipment: 3-in. I.D. precision-bore glass column with a 9-ft. cartridge as described in notes.

Run No.	Cartridge	Interface Position	Pulse Ampl., In.	Pulse Freq., Cyc./Min.	Volume Velocity Gal./(Hr.)(Sq.Ft.), Sum of Both Phases	Type of Flooding Threshold
3"-40-ASH	(a)	Top	0.6	65 ± 5	480	Complete
3"-41-ASH	(a)	Top	0.6	75 ± 5	240	Complete
3"-42-ASH	(a)	Bottom	0.6	55 ± 5	480	Complete
3"-43-ASH	(a)	Bottom	0.6	65 ± 5	240	Complete
3"-47-ASH	(b)	Top	0.6	105 ± 5	480	Complete (c)
3"-48-ASH	(b)	Top	0.6	115 ± 5	240	Complete (d)
3"-49-ASH	(b)	Bottom	0.6	105 ± 5	480	Cyclic Local
				115 ± 5	480	Complete
3"-50-ASH	(b)	Bottom	0.6	115 ± 5	240	Complete
3"-54-ASH	(b)	Top	1.2	45 ± 5	480	Cyclic Local
				65 ± 5	480	Complete
3"-55-ASH	(b)	Top	1.2	55 ± 5	240	Cyclic Local
				75 ± 5	240	Complete
3"-56-ASH	(b)	Bottom	1.2	65 ± 5	480	Complete
3"-57-ASH	(b)	Bottom	1.2	65 ± 5	240	Complete
3"-58-ASH	(e)	Top	1.0	67 ± 3	480	Complete
3"-59-ASH	(e)	Top	1.0	85 ± 5	240	Complete
3"-60-ASH	(e)	Top	1.5	52 ± 3	480	Complete
3 -61-ASH	(e)	Top	1.5	62 ± 3	240	Complete
3"-62-ASH	(e)	Top	1.5	40	745 ± 25	Complete
3"-63-ASH	(e)	Top	0.6	95 ± 5	480	Complete
3"-64-ASH	(e)	Top	0.6	125 ± 5	240	Complete
3"-65-ASH	(e)	Top	0.6	45 ± 5	960	Complete
3"-66-ASH	(e)	Top	1.0	40	850 ± 25	Complete
3"-72b-ASH	(f)	Bottom	1.0	72 ± 2	480	Complete

Notes:

(a) 2-31/32-in.-diameter stainless steel nozzle plates with 5 per cent free area, 1/16-in. holes, 0.03-in.-deep nozzles, and 2-in. spacing.
(b) 2-31/32-in.-diameter stainless steel nozzle plates with 9.8 per cent free area, 1/16-in. holes, 0.026-in.-deep nozzles, and 2-in. spacing.
(c) Coalescence threshold at <80 cycles per minute.
(d) Coalescence threshold at 85 ± 5 cycles per minute.
(e) 2.98-in.-diameter fluorothene plates with 3/16-in. holes, 23 per cent free area, and 2-in. spacing.

[redacted]

TABLE III

PUREX 3-INCH HA SCRUB COLUMN EFFICIENCY STUDIES

Flowsheet: Purex HW No. 3, F.P.'s omitted, NaCl added to HAF. Diluent: Shell E-2342.
Equipment: 3-in. I.D. precision-bore glass column with a 9-ft. cartridge as described in notes.

Run No.	Cartridge	Interface Position	Pulse Ampl., In.	Pulse Freq., Cyc./Min.	Volume Velocity Gal./(Hr.)(Sq.Ft.), Sum of Both Phases	L/V, Aq./Org. Vol. Flow Ratio	Cl^- D.F.[a]	HTU[b] Ft.	Hold Up[c]
3"-37b-ASH	(d)	Bottom	0.6	60	480	0.187	7.5	2.8	
3"-37c-ASH	(d)	Bottom	0.6	50	250	0.205	10.6	2.4	
3"-38a-ASH	(d)	Top	0.6	60	490	0.178	6.4	3.0	
3"-38b-ASH	(d)	Top	0.6	80	480	0.176	10.0	2.2	
3"-44-ASH	(e)	Top	0.6	60	480	0.183	11.7	2.1	
3"-45a-ASH	(e)	Bottom	0.6	50	500	0.192	4.5	4.3	
3"-45b-ASH	(e)	Bottom	0.6	40	490	0.198	2.4	8.2	
3"-46-ASH	(e)	Bottom	0.6	60	230	0.206	10.8	2.4	
3"-51-ASH	(f)	Top	0.6	70	480	0.186	13.1	2.0	
3"-52a-ASH	(f)	Bottom	0.6	100	480	0.188	6.9	3.0	
3"-52b-ASH	(f)	Bottom	0.6	70	470	0.191	3.2	5.0	
3"-53-ASH	(f)	Bottom	0.6	100	250	0.172	9.1	2.3	
3"-67a-ASH	(d)	Top	0.6	70	480	0.194	6.4	3.2	18
3"-67b-ASH	(d)	Top	0.6	80	490	0.184	7.4	2.8	21
3"-67c-ASH	(d)	Top	0.6	90	480	0.195	11.1	2.3	25
3"-67c-ASH	(d)	Top	0.6	102	490	0.189	19.8	1.7	55
3"-68a-ASH	(d)	Top	1.5	40	500	0.187	6.8	2.9	25
3"-68b-ASH	(d)	Top	1.5	51	480	0.188	16.6	1.8	60
3"-69a-ASH	(d)	Bottom	0.6	40	480	0.200	4.9	3.9	12
3"-69b-ASH	(d)	Bottom	0.6	70	490	0.191	6.1	3.3	22
3"-69c-ASH	(d)	Bottom	0.6	100	490	0.193	12.7	2.1	
3"-70a-ASH	(d)	Top	0.6	100	250	0.214	35.9	1.5	16

DECLASSIFIED

DECLASSIFIED

TABLE III (Continued)

Run No.	Cartridge	Interface Position	Pulse Ampl., In.	Pulse Freq., Cyc./Min.	Volume Velocity Gal./(Hr.)(Sq.Ft.), Sum of Both Phases	L/V, Aq./Org. Vol. Flow Ratio	Cl^- D.F.[a]	HTU[b] Ft.	Hold Up[c]
3"-70b-ASH	(d)	Top	0.6	110	250	0.214	22.3	1.7	16
3"-70c-ASH	(d)	Top	0.6	(g)	250	0.197	21.8	1.7	51
3"-71a-ASH	(d)	Top	1.0	40	480	0.199	4.7	4.1	13
3"-71b-ASH	(d)	Top	1.0	50	460	0.201	4.1	4.7	13
3"-71c-ASH	(d)	Top	1.0	60	480	0.193	6.3	3.2	22
3"-71d-ASH	(d)	Top	1.0	70	460	0.207	13.8	2.1	23
3"-71e-ASH	(d)	Top	1.0	90	480	0.193	19.3	1.7	63
3"-72a-ASH	(h)	Bottom	1.0	60	480	0.202	3.0	6.0	12
3"-72b-ASH	(h)	Bottom	1.0	70	470	0.194	5.5	3.6	
3"-72c-ASH	(h)	Bottom	1.0	50	490	0.189	1.8	12.8	8
3"-73a-ASH	(h)	Bottom	1.0	50	710	0.192	2.0	10.0	9
3"-73b-ASH	(h)	Bottom	1.0	60	720	0.189	3.5	5.3	

Notes:

(a) Defined as $\frac{Cl^- \text{ concentration in organic influent}}{Cl^- \text{ concentration in organic effluent}}$.

(b) Height of a transfer unit, overall organic-film basis.

(c) Per cent holdup of the dispersed phase. Measured by shutting off all streams and measuring change in the interface position.

(d) 2.98-in.-diameter stainless steel plate with 1/8-in. holes, 23 per cent free area, and 2-in. spacing.

(e) 2-31/32-in.-diameter stainless steel nozzle plates with 1/16-in. holes, 5 per cent free area, 0.03-in. nozzle depth, and 2-in. spacing.

(f) 2-31/32-in.-diameter stainless steel nozzle plate with 1/16-in. holes, 9.8 per cent free area, 0.026-in. nozzle depth, and 2-in. spacing.

(g) Frequency was varied within a 122 to a 144 cycle per minute range to maintain column in an incipient flooding condition.

(h) 2.98-in.-diameter fluorothene plates with 3/16-in. holes, 23 per cent free area, and 2-in. spacing.

URANIUM RECOVERY DEVELOPMENT

Process Chemistry

Lubricant for RDIS Make-Up Tank Pump. Because the grease currently used for this pump (Merco-Nordstrom 147S) has a low melting point (80°F.) it is frequently melted and leached, leaving the pump without adequate lubrication. Use of Merco-Nordstrom 421S grease having a melting point of 200°F. is proposed. Since this grease is soluble in TBP-diluent mixtures, the effect of its presence in solvent on fission product distribution, as well as dispersion and disengaging times was studied. No effect on fission product distribution during batch extraction, scrub, and strip tests was observed for concentrations of the grease in 20% TBP-Shell E-2342 up to four grams per gallon. Similarly, dispersion and disengaging times for simulated extraction, scrub, and strip contacts were unaffected for concentrations of the grease up to one gram per gallon of solvent. At four grams per gallon, emulsion-type dispersion could not be obtained during dilute strip contacts, even after several minutes stirring time (normal dispersion time $<$ 2 sec.).

Continuous Calcination of UNH. A series of hydration-dehydration runs was made in the three-in. continuous calciner using as feed material powder produced during 321 Bldg. Run B-26. This material had been calcined without additives and had a reactivity ratio of 0.29 (800°C. reduction - 410°C. hydrofluorination). During the hydration runs, powder holdup time was four hours and powder temperature was either 105°C. or 85°C. Water was added near the feed point at a rate equivalent to three times the stoichiometric amount required for formation of the monohydrate. Hydration (to the monohydrate) was incomplete at a powder temperature of 105°C. and a nonhomogenous product having a relatively low reactivity ratio (0.67; above conditions) was obtained. At a powder temperature of 85°C. hydration to the monohydrate was nearly complete. Samples of the product powder contained five to six per cent water and had a reactivity ratio of 0.82. Although about 80 per cent of the UO_3 remained as spheres during the hydration, its ability to flow was sharply reduced.

The dehydration runs were made batchwise in the three-inch calciner at powder temperatures of 180, 250, and 300°C. At 180°C. the water content was reduced to 2.5 per cent in 2.5 hours with little further dehydration in an additional four hours. At 250°C., the water content was reduced to 1.3 and 1.0 per cent at two and three hours, respectively, while at 300°C. a powder containing one per cent water was obtained in two hours. Reactivity ratio values are not yet available for all runs. Tentatively, the ratios were increased by about 0.1 and 0.3 units at 800 and 590°C. reduction, respectively by dehydration.

Reactivity ratios (800°C. reduction) were determined for blends of pot powder with continuous powders produced under (1) low feed-point temperature, (2) high feed-point temperature, (3) low sulfate, (4) high sulfate, and (5) partial hydration conditions. In all cases the ratios were, within the limits of experimental error, equal to those calculated assuming the reactivity of a blend to be the sum of the products of each powder's reactivity by its fraction in the blend.

[redacted]

Chemical Engineering Development

Continuous Calcination. In view of the prospective use of a fluidized bed reduction step at Paducah which might operate more satisfactorily on a particular particle size, the previous continuous calcination data was reviewed in an effort to determine whether UO_3 particle size could be correlated with operating variables. Although there are conflicting data, the following operating conditions tend to produce small particles:

1. Operation at feed point temperatures above 260°C.
2. The use of a small agitator shaft to trough diameter ratio.
3. Reducing the time the particles are exposed to the feed (accomplished by mechanically isolating the finishing section from the reaction section).

Preparations are being made to carry out hydration tests in the semiplant scale reactor if promising conditions result from Process Chemistry Unit studies.

WASTE TREATMENT

Process Chemistry

Uranium Recovery Process. Scavenging of current Uranium Recovery Process wastes is in good control. Supernatant liquids from the last three tanks filled (25, 26, and 27) contained about 0.02 μc/ml. of Cs and of Sr which is well below provisional cribbing limits for these activities (0.1 μc/ml.). Soil column tests by Earth Sciences showed that at least three column volumes of the solutions can be passed through soil before either Cs or Sr break through.

Stored Wastes. The scavenging operation in the 200-East Area in-farm facility has proceeded much as predicted from laboratory work. Concentrations of Sr and Cs in the scavenged wastes have been, in general, below the target 0.1 μc/ml. However, supernatant liquids from the third and fourth tanks filled (3-112C-111C and 4-109C-110C) were found unsuitable for disposal to ground due to poor retention of both Cs and Sr by the soil. Cooperative studies to date by Process Chemistry and Earth Sciences show that a small amount of aluminum (ca. 10^{-3} M) present in supernatant liquid from these tanks is responsible for the poor retention. A solution prepared by spiking a small amount of aluminum into scavenged current Uranium Recovery process waste (25-110-BY), which contained no aluminum and showed excellent soil retention for both Cs and Sr, showed the same poor retention as solution from 3-112C-111C. Similarly, mixtures of solutions from 3-112C-111C and 25-110-BY showed poor retention of Cs and Sr. From these experiments it appears that satisfactory retention of Cs and Sr will be obtained if the aluminum concentration is 10^{-4} M or less. Studies of modifications in the scavenging procedure to obtain satisfactory removal of aluminum from the stored wastes containing it are in progress.

Detailed scavenging procedures for four more tanks of stored waste in 200-West Area (102-TY, 105-TY, 106-TY and 103-TX) were determined and transmitted by letter to Plant Processes, T & U Plant Processes Unit.

DECLASSIFIED

MISCELLANEOUS DEVELOPMENT

Chemical Engineering Development

Continuous Uranium Dissolution. Five semicontinuous slug dissolution runs were made during the month in the 321 Building pot-type downdraft dissolver. Aluminum-jacketed slugs were charged at 45-minute intervals and nitric acid containing mercuric ion (to catalyze aluminum jacket dissolution) was added at 15-minute intervals. Product overflowed the 150 liter pot continuously. Heel sizes were varied from 270 to 660 lb. A summary of the data is given in Table IV.

Dissolution rates ranged from 0.3 to 0.9 tons U/(ton heel)(day) at product compositions of 1.8 M UNH, 0.9 M HNO_3; and 2.2 M UNH, 2.0 M HNO_3, respectively. The data appear to correlate according to the equation:

$$k = \frac{\text{Rate}}{(H^+)(NO_3^-)} = 0.065$$

in which: Rate = tons U dissolved/(ton heel)(day)
(H^+) = hydrogen ion concentration
(NO_3^-) = total nitrate ion concentration

If the above correlation is shown by additional experimentation to be correct, it appears that the present Purex Plant dissolvers operated semicontinuously will provide sufficient capacity for operation at a capacity factor of 4. Due to the desired low acid concentration from Redox dissolvers, however, semicontinuous operation will not suffice for Phase IV operation.

With 0.0055 M Hg^{++} in the acid feed, the aluminum jackets dissolved in 0.5 to 1.5 hours and the bonding layer was destroyed in 5.5 to 9.5 hours. When the Hg^{++} concentration was reduced to 0.00275 M, however, the jackets required more than 20 hours to dissolve. Peak hydrogen evolution rates occurred within 15 to 25 minutes after a slug addition and maximum instantaneous values ranged from 0.0416 to less than 0.009 std.cu.ft./min. Higher hydrogen evolution rates occurred during runs in which there was a higher hydrogen ion concentration in the dissolver solution. When two slugs (instead of one) were charged at once, the peak hydrogen evolution rate approximately doubled; however, if three or four slugs were charged simultaneously, the peak hydrogen evolution rate did not increase proportionately.

DEL

TABLE IV

SUMMARY OF CONTINUOUS CATALYTIC POT-DISSOLVER STUDIES

Run No.	Heel Size, Lb.	Feed Composition M Hg^{++}	Feed Composition Wt. % HNO_3	Feed Rates Uranium Lb./Hr.	Feed Rates HNO_3/U Mole Ratio	Product Composition M $\bar{U}NH$	Product Composition M $H\bar{N}O_3$	Product Composition M $\bar{N}O_3^-$	Dissolution Rate Ton U/Ton Heel-Day	$k = \frac{Rate}{(H^+)(NO_3^-)}$	Maximum H_2 Evolution, Std.Cu. Ft./Min.
CP-2	270	0.005	47	10.6	4.33	2.20	1.96	8.14	0.945	0.0591	--
CP-2a	(1)	0.00275	47	10.6	4.33	1.98	2.63	--	(1)	(1)	0.009
CP-3	402	0.0055	39	5.3	4.15	1.83	0.90	6.04	0.316	0.0581	0.019
CP-5	319	0.0055	45.5	10.6	4.90	2.04	1.55	7.28	0.804	0.0711	0.0416
CP-6	664	0.0055	39	12.7	4.18	1.87	1.03	6.29	0.462	0.0714	0.022

Notes: (1) After 20 hours operating time the jackets had not dissolved.

(2) Maximum instantaneous rates. This peak in hydrogen evolution usually occurred between 15 and 25 minutes after each slug addition.

DECLASSIFIED

In-Line Chemical Instrumentation

Purex Plant Installation. The gamma scintillation probe for the steam condensate header (8822) monitor failed from overheating. The temperature at the probe in this installation is too high (>50°C.). Cooling will have to be provided or the sample cell probe will have to be relocated before satisfactory operation can be expected.

The status of the Purex gamma monitor installations is summarized in the tabulation below:

Sampler	Stream	Status
J-3	IBXF	Rotometer being installed. Probe replaced - Original gave poor wave shape.
L-3	2BP	No sample being delivered. Leak testing in progress.
K-5	2EU	Jumper alteration required to improve sample delivery.
K-4	2EU Condensate	No installation - Equipment used for J-3 installation.
F-5	AAD	Installed - not activated.
J-8	ICU Condensate	Installed - not activated.
H-4	HCP Condensate	Rotometer and piping now being installed.

Hot Semiworks Installation. The cadmium sulfide colorimeter unit assembled by Chemical Research has operated satisfactorily on the 1AP stream for a period of four weeks. The Hot Semiworks organic stream was recently checked for color buildup to determine the need for a color determination on the 100 stream. The sample checked had color equivalent to seven grams per liter uranium. This makes it necessary to correct uranium concentration data on the HAP, IAP, and IBU streams using 100 stream color determination data.

The fluorothene-coated glass gamma scintillation cells fabricated according to the best known techniques have given unsatisfactory service on recent runs. Although adverse conditions were encountered when a rework run was made, a satisfactory cell should be able to withstand these conditions. To date a good bond has not been consistently obtained between the fluorothene and the glass. When the coating fails it is impossible to flush background activity from the cell.

Laboratory Testing. A test polarograph having the unique feature of isolating the polarographic electrolysis cell from the mercury trap has been assembled. This unit minimizes the probability of contaminating fresh process samples with reaction products from the used mercury and nitric acid. The mercury and process solution are completely swept from the cell after each polarographic voltage scan and in addition the mercury is separated from the process solution before the sample is returned to the process stream.

A "Westronic" miniature strip chart recorder is being use tested recording the polarograms produced in operation of the test polarograph. In three weeks operation the unit has not changed calibration and it has operated smoothly and reliably.

An automatic in-line dilution apparatus has been assembled for feasibility testing All electrical and hydraulic testing is complete. The precision of the apparatus will be determined using acid dilutions for evaluation.

Piston-Bellows Pulse Unit. The prototype piston-bellows pulse unit and the two units installed in the Hot Semiworks have given trouble-free operation to date. Two additional units have been fabricated for use in the Hot Semiworks. They differ from the original units in that Armco 17-4 PH hardenable stainless steel was used for the cylinders. The cylinders were bored undersize, heat treated to Rockwell C 40-44 and ground to finished size. The hard surface should exhibit better wear characteristics than the surface of the 309 SCb previously employed.

Johnston Splined Shaft Pump. A semienclosed impeller deep well turbine pump equipped with broached impellers and a splined shaft has been received and put on test. The splined shaft unit can be disassembled and reassembled in about 1-1/2 man hours compared to six man hours for the older model pumps.

Chemical Compatibility and Radiation Stability. Samples of Poly-FBA, (a polymer of 1, 1-dehydroprefluorobutyl acrylate) manufactured by the Minnesota Mining and Manufacturing Company, have shown excellent resistance to 60 per cent nitric acid at room temperature, 50 per cent caustic soda, carbon tetrachloride, tri-butyl-phosphate (TBP), Purex solvent (TBP - kerosene), Recuplex solvent (CCl_4 - TBP) and Xylol. After 50 days exposure at room temperature less than six per cent swell occurred in all samples. On the other hand, the material swelled about 20 per cent in Hexone during a 50-day exposure, and was destroyed in less than one hour when exposed to boiling 60 per cent nitric acid.

Vyflex L-10, a plasticized polyvinyl chloride marketed by the Kaykor Industries, swelled less than 10 per cent during five months exposure to 60 per cent nitric acid, 50 per cent caustic soda, carbon tetrachloride, TBP, and Purex solvent. Samples of Vyflex L-10 exposed to TBP and Purex solvent after radiation to 10^8 R gamma swelled about 20 per cent in 50 days

DECLASSIFIED

DECLASSIFIED

DEL

CHEMICAL RESEARCH SUB-SECTION, W. H. REAS

PUREX

Effect of Versene on Zirconium-Niobium Decontamination

Results obtained during the report period indicate substantial improvement of zirconium-niobium decontamination can be accomplished by addition of "Versene" (ethylenediamine tetraacetic acid) to Purex systems.

Results obtained in batch contactings simulating a Purex 1A extraction step are summarized in Table I. Purex plant 1AF (obtained during the recent plant shutdown) was employed as feed in these experiments.

TABLE I

EFFECT OF VERSENE AND VERSENOL ON
EQUILIBRIUM DISTRIBUTION OF ZIRCONIUM-NIOBIUM

M Additive in 1AFS	M HNO_3 in 1AFS	Solvent	g/l U in Organic	E_d (Zr-Nb)
0	1.75	R-1-A*	75	0.01
0.006 M Versenol	1.75	Purex 100 (2-1-56)	78	0.0008
0.0006 M Versene	1.75	Purex 100 (2-1-56)	78	0.0004
0.0006 M Versene	2.25	R-1-A*	73	0.0007
0.0006 M Versene	3.5	R-1-A*	73	0.0012

- - - - - -

* Plant make-up solvent.

It will be noted that addition of 0.0006 molar "Versene" to a low-acid 1AFS sufficed to reduce the distribution coefficient for zirconium-niobium by a factor of 25. "Versenol" (hydroxyethylenediamine triacetic acid) was less effective; addition of Versenol to a concentration of 0.006 molar resulted in a zirconium-niobium distribution coefficient twice that obtained with 0.0006 molar Versene.

The effect of Versene is, as expected, lessened as the acidity is increased.

Results of 1A-1C Mini runs made to test the effect of Versene on zirconium-niobium decontamination in the Purex 1A system are summarized in Table II.

DECLASSIFIED

DEL

TABLE II

EFFECT OF VERSENE ON ZIRCONIUM-NIOBIUM DECONTAMINATION IN PUREX 1A MINI RUNS

Run No.	Temp(°C) 1A	Temp(°C) 1C	1AF(A) Flow 100 M U	1AF(A) Flow 100 M HNO_3	1AS Flow 67 M HNO_3	Solvent Source(C)	Solvent Flow	M Versene Feed	M Versene Scrub	Zirconium-Niobium Decontamination Factors 1AF/F.P.	1AF/1AP	1AF/1CU	1AW Pu Waste Loss(%)
228	Rm	50	1.8	1.0	1.5(B)	R-1-A	500	0	0	10	210	220	2.6
229	60	50	1.8	1.0	1.5(B)	R-1-A	500	0	0	5	90	100	0.006
31	Rm	Rm	1.35	2.0	3.0	R-1-A	380	0	0	7	100	103	2.2
32	Rm	Rm	1.35	2.0	3.0	R-1-A	380	0	0.0013	61	740	600	4.2(avg)
33	60	Rm	1.35	2.0	3.0	R-1-A	380	0	0.0013	140	1860	---	0.035
37	60	50	1.30	2.0	3.0	Purex 100	350	0	0.0013	---	53	107	0.013
38	50	50	1.85	1.0	1.5	R-1-A	500	0.0013	0.0013	840	No FP Detected	2200	0.014
39	Rm	50	1.35	2.0	3.0	Purex 100	380	0	0	19	21	31	0.016
313	36	40	1.65	0.8	2.0	PX-16 1AX	450	0	0.0013	250	530	480	0.006
314	50	50	1.65	0.8	1.5	R-1-A	450	0.0013	0.0013	---	2800	2400	0.04

- - - - - - - - - - - - -

(A) Runs 228 through 39 used Purex 1AF sampled during plant shutdown. 313 and 314 used HSW PX-16 1AF

(B) Dual Scrub: 1AIS = 3.0 M HNO_3; 1AS = H_2O.

(C) RIA Purex make-up solvent
Purex 100 (Sampled 3/1/56) contained enough Zr-Nb to limit 1AF/1AP Zr-Nb DF to 50 if no Zr-Nb transferred from 1AX to 1AW.

Addition of Versene to a concentration of 0.0013 molar in the 1AS in runs employing Purex plant 1AF and make-up solvent (R-1-A) resulted in a seven-fold improvement in the zirconium-niobium decontamination from 1AF to 1AP (Runs 31 and 32). Increasing the temperature of the 1A Mini unit to 60 C with Versene in the 1AS resulted in an additional improvement by a factor of about 2.5 (Run 33). Decontamination factors for ruthenium from 1AF to 1AP were 34 in Run 31, and 150 in Run 32.

Addition of Versene to a concentration of 0.0013 molar in both the 1AS and the 1AF, in conjunction with a low-acid flowsheet and elevated temperature operation of the 1A Mini unit resulted in a uranium product in which the zirconium-niobium activity was approximately 1.5 γ/min, mg U (corresponding to a total gamma activity of about 2.5 c/min, mg U) and in which the ruthenium activity was below the gamma spectrometer detection limit.

Unfortunately, Versene was less effective when employed in conjunction with plant 100 (cf. Run 37). However, it should be noted that the 100 used in this run contained more than enough zirconium-niobium activity to account for the activity found in the 1AP.

Run 313 employed the 1AF, 1AX, and Versene-containing 1AS which were used in Hot Semi-Works Run PX-16. Since no control run was made, it is not possible to determine to what extent the zirconium-niobium decontamination was improved by use of Versene.

In Run 314, addition of Versene to a concentration of 0.0013 molar in both 1AF and 1AS in conjunction with elevated temperature operation of the 1A Mini unit again resulted in a zirconium-niobium decontamination factor in excess of 2000, in this case with Hot Semi-Works 1AF. Decontamination factors for ruthenium to the 1CU were 150 in Run 314 and 40 in Run 313.

It may be noted that plutonium losses were acceptably low in all runs in which the 1A Mini unit was operated at elevated temperature, whether Versene was present or not. The high losses observed in certain of the runs employing a room temperature 1A unit are presumed indicative merely of poor contacting efficiency at room temperature with the Mini unit employed for these runs and not of any tendency of Versene to suppress plutonium extraction.

Effect of Versene on Solvent Decontamination

Experiments were performed to explore the possibility of employing Versene to improve removal of zirconium and niobium from solvent in the carbonate wash step. Unfortunately, results to date have been something less than clear cut.

No significant improvement in zirconium-niobium decontamination of Purex plant 100 was noted on substituting five percent sodium carbonate containing 0.01 molar Versene for five percent sodium carbonate in batch contacts at room temperature. Some improvement was noted in batch contacts at 60 C, however.

DECLASSIFIED

The zirconium-niobium decontamination factor obtained with the Versene-containing carbonate solution was about six as compared with a value of about two for five percent sodium carbonate alone. The sample of IOO used for this test was obtained on 3/1/56 and had been stored for a period of 12 days prior to this test.

The zirconium-niobium activity in this sample of Purex IOO appeared to become more firmly bound as the solvent aged. After storing the IOO for a period of 19 days, batch contactings at 60 C with 5 percent Na_2CO_3 containing 0.01 M Versene, and with 5 percent Na_2CO_3 resulted in decontamination factors for zirconium-niobium of 4 and 2, respectively. After storing for an additional 5 days identical decontamination factors of about 2.5 were obtained on putting the IOO through a simulated "0" column operation in a Mini unit with 5 percent Na_2CO_3 and with 5 percent Na_2CO_3 containing 0.01 molar Versene.

Further work is planned to determine the effect of Versene on removal of zirconium-niobium activity from fresh samples of Purex IOO and the decontamination behavior of solvent so treated.

Effect of Altered Intercycle Concentration Conditions on Zirconium-Niobium Extractability

Further experiments have been performed to explore the possibility of altering conditions in Purex intercycle concentration steps to improve zirconium-niobium decontamination performance in subsequent solvent extraction cycles. Results to date have been uniformly negative, however.

Attempts were made to reduce the extractability of zirconium-niobium in Purex 1AF by addition of caustic (to a final composition of 0.96 M U, 1.5 M $NaNO_3$, - 0.02 M HNO_3 in one case and 0.93 M U, 1.5 M $NaNO_3$, 0.1 M HNO_3 in another case) followed by digestion at the boiling point for a period of 22 hours. The extractability of the zirconium-niobium was determined by measuring the distribution coefficient for zirconium-niobium in a batch extraction simulating a low acid 1A column feedplate (1.5 M HNO_3 in aqueous, 75 g/l U in organic at equilibrium). In neither case was the extractability of zirconium-niobium altered perceptibly by the digestion treatment.

These experiments were repeated with inactive zirconyl nitrate added to a concentration of 10^{-3} molar in these feeds after acidity adjustment. Again, no significant change in zirconium-niobium extractability was accomplished by digesting these solutions for 18 hours at the boiling point.

SnO Head-End Studies

Exploratory experiments show some promise for improving zirconium-niobium decontamination in Purex by application of a head-end scavenging step employing stannous oxide to remove zirconium and niobium. Earlier work

had shown this operation, which entails digestion of feed with solid stannous oxide (leading presumably to partial conversion to stannic oxide) to be quite effective in removing protactinium and zirconium-niobium from Thorex feeds. It was thought that such a head-end operation might be desirable in Purex since it would not result in any appreciable ruthenium evolution.

Tracer experiments employing diluted Hot Semi-Works HAF as feed yielded zirconium-niobium decontamination factors in excess of 100 (the gamma spectrometer detection limit for the activity level employed) when solutions one molar in uranyl nitrate and one molar in nitric acid were scavenged with 0.05 molar stannous oxide.

The precipitates formed upon addition of tin in solution as stannous sulfate or as sodium stannate were more voluminous than the solid phases formed by digestion of solid stannous oxide and yielded poorer zirconium-niobium decontamination.

Experiments performed with one to four percent activity levels employing Hot Semi-Works HAF (aged about 1.5 months) as the source of activity gave results as summarized in Table III. In these experiments the solvent extraction behavior of the zirconium-niobium species remaining after the stannous oxide treatment was followed by a batch procedure consisting of a batch extraction (with the aqueous feed made up to 3.5 M HNO_3), followed by two batch scrubs with one-fourth volume portions of a scrub solution 3.5 M in nitric acid and 0.05 M in uranyl nitrate.

In certain of the experiments the feed solution contained only half the desired amount of uranium with the result that solvent saturation was lower in the extraction steps than had been planned and some additional uranium extraction occurred during the scrub steps.

It appears that the stannous oxide treatment is more effective in removing the inextractable species of zirconium-niobium than the extractable species but that at least partial removal of the latter is accomplished. Further studies along these lines are planned with full-level activities.

Experiments have been performed to evaluate the carrying of plutonium(IV) on stannous oxide out of simulated HAF solutions containing process-level plutonium. In three experiments the amounts of plutonium retained by the solid phase after exhaustive washing were 3.6, 0.8, and 1.6 percent. All washes were analyzed in the case where the final retention was 1.6 percent. In this case the five successive washes contained 1.7, 0.26, 0.066, 0.035, and 0.034 percent, respectively, of the feed plutonium.

It appears, therefore, that a significant amount of plutonium would be carried if the stannous oxide treatment were applied in the presence of plutonium(IV). An objective of further studies is to characterize the carrying of plutonium(III) and plutonium(VI) on stannous oxide. Results obtained

DECLASSIFIED

DECLASSIFIED

TABLE III

EFFECT OF SnO SCAVENGING ON ZR-NB DECONTAMINATION IN SOLVENT EXTRACTION

Scavenging Conditions				Zr-Nb DF after			Ru DF after		
M U	M HNO_3	M SnO	Digestion Time at 95-100 C,(hrs)	Scavenging	Extraction	2 Scrubs	Scavenging	Extraction	2 Scrubs
Solution Not Scavenged				---	100	1200	---	31	910
1.35	2.0	0.06	2.7	38	730	5000	1.0	31	540
0.68	2.0	0	2.5	---	170	1700	---	180	1400
2.0	0.2	0	2.2	---	73	670	---	210	960
2.0	0.2	0.12	2.2	>100[a]	1500	4700	1.1	270	2000
0.68	2.0	0	2.5	---	1100(?)	1500	---	84(?)	58
0.68	2.0	0.06	2.5	>160[a]	2200	4×10^4	1.7	10	120
0.68	2.0	0.12	2.2	>160[a]	>6000[a]	3×10^4	0.9	32	190
1.0	0.2	0.12	2.0	>160[a]	3800	1.1×10^4	2.1	53	960

- - - - - - - - -

a) Based on gamma spectometer detection limit of 5 percent of total gamma activity.

in low-level scavenging studies indicate that zirconium-niobium carrying is not adversely affected by either dichromate or sulfamic acid. The fact that neither the rare earths nor the uranyl ion are carried in the stannous oxide treatment suggests that either plutonium(III) or plutonium(VI) would be less efficiently carried than is plutonium(IV).

Purex "Tail-End" Studies

A number of scouting experiments have been performed in a search for solid absorbents or ion exchangers superior to silica gel for "tail-end" decontamination of uranium. A synthetic feed of composition 1.98 M U, 0.08 M HNO_3, 3.6×10^6 Zr-Nb γ/m, ml, 1.0×10^5 Ru-Rh γ/m, ml was prepared for these studies by diluting Purex 1AF with a synthetic 2EU solution. Results obtained to date may be summarized as follows:

1. A zirconium phosphate inorganic cation exchanger marketed by the Minnesota Mining and Manufacturing Co. gave virtually identical results as silica gel with the above feed at room temperature. This test was conducted with identical columns (1.0 cm diameter by 4.0 cm long) of the zirconium phosphate exchanger and silica gel, and an average zirconium-niobium decontamination factor of about 4 was obtained through 100 column volumes with both adsorbents. These small (and relatively inefficient) columns were used in the hope that they could be operated to break-through. However, the available feed stock was exhausted without break-through being attained so no conclusion can be drawn as to the relative capacities of the zirconium phosphate and silica gel.

2. A phosphonic acid cation exchange resin made by the Chemical Process Company gave very little adsorption of zirconium-niobium out of this feed.

3. No significant decontamination was obtained with a commercial anion exchange resin ("Doulite A-41"). Pretreatment with reagents designed to alter the exchangeable anion likewise failed to yield any appreciable decontamination. Anions tested included hydroxide, phosphate, tannate, and mandelate. Difficulties were encountered with phosphate and tannin because of precipitation of the uranium.

4. Scavenging of the synthetic 2EU with tannin proved moderately effective, giving gross gamma decontamination factors of 5 to 10. Tannin is known to precipitate many metal ions out of systems in which they exist as hydrophilic hydrous oxide colloids. The mechanism is presumed to be neutralization of the positively charged metal sol by the negatively charged tannin sol. This technique has been employed to effect separation of niobium from other metals, utilizing the fact that niobium can be precipitated by tannin at higher acidities than can other metals.

Experiments were performed employing the tannin-niobium complex, both co-formed and pre-formed. With the described synthetic 2EU solution and pre-formed tannin-niobium complex gross gamma decontamination factors ranged from 5.7 with 0.8 mg niobium per gram of uranium to 9.3 with 4.0 mg niobium per gram of uranium. The process was more efficient when the tannin-niobium precipitate was co-formed. Precipitation of 0.02 mg niobium per gram of uranium gave with this procedure a gross gamma decontamination factor of 5.5.

Since the lack of solids separation equipment precludes the use of such a precipitant as a tail-end processing step for the Purex uranium product, further studies of this complex will be directed toward study of its effect on reducing the solvent extractability of zirconium and niobium.

Additional work is also planned with the zirconium phosphate cation exchanger, employing plant 2EU and examining the effects of temperature and solution composition on the partition of zirconium and niobium between the solution and the solid phase.

It is planned also to study phosphate esters as solid adsorbents for removing zirconium-niobium from Purex uranium products. Experience with the effect of phosphate in solution in suppressing extraction of zirconium and niobium suggests that phosphate esters incorporated in a solid matrix might be quite effective adsorbents for zirconium and niobium out of uranium-containing solutions.

URANIUM PROCESSING

Chemical Preparation of Uranium(IV) Fluorides

The extent of uranium loss in the reduction-precipitation step was determined in a series of experiments in which the mode of precipitation and source of sodium ion were varied. The data are summarized in Table IV.

Uranium losses were neglibibly low in all instances, and only slight variations in the iron content were observed. Tap densities were slightly greater when sodium was introduced as the sulfate instead of as the chloride.

A series of experiments was also performed to determine the effect of reprecipitation procedure on iron decontamination. The data are summarized in Table V.

In all cases the final iron content was within existing tolerance limits established for either uranium metal or shipped uranium trioxide. Products with higher tap densities were produced when the sodium ion concentration was high with respect to both uranium and fluoride concentration. Analytical data concerning the extent of uranium loss (to supernate) in the reprecipitation step are incomplete; however, recycle of the supernatant solution to the reduction-

TABLE IV

REDUCTION-PRECIPITATION OF SODIUM URANIUM FLUORIDE-
EFFECT OF PROCESS VARIABLES ON URANIUM LOSS,
IRON CONTENT AND TAP DENSITY

Run	Precipitation Procedure	U Loss %	Tap Density g/cc	Iron Content % of U
2-I	Addition of 1200 ml of 1.92 M $FeCl_2$, 11.8 M HF to 2000 ml 0.5 M UNH, 1.5 M NaCl	0.057	1.36	0.34
2-II	Like 2-I except 1.5 M NaCl was replaced by 0.75 M Na_2SO_4	0.034	1.62	0.43
2-III	Addition of 1700 ml of 1.35 M $FeCl_2$, 8.4 M HF to 1700 ml 0.59 M UNH, 1.76 M NaCl	0.023	1.25	0.36
2-IV	Like 2-III except 1.76 M NaCl was replaced by 0.88 M Na_2SO_4	0.025	1.45	0.43

Notes: Addition rate was 500 ml/hr. Temperature was ambient. All $NaUF_5$ precipitates were washed twice by decantation with 1000 ml portions 0.2 M NaCl, 0.3 M HF or 0.1 M Na_2SO_4, 0.03 M HF; twice with absolute ethanol and dried at 110 C for 72 hours.

precipitation step would be done anyway as a fluoride conservation measure, thus eliminating any substantial loss. The above experiments essentially complete the study of the reduction-precipitation, methathesis and reprecipitation steps. Sufficient data have been obtained to define the conditions under which uranyl nitrate can be converted to suitably iron-free sodium uranic fluoride using ferrous chloride as a reductant. Therefore, further studies will be designed to establish the capacity of this process for fission product and metal ion decontamination.

Preparation of Uranium Hexafluoride

Several batches of uranium tetrafluoride were prepared by the vacuum decomposition of ammonium uranic fluoride. In some instances, due to leakage into the vacuum system, a product of poor reaction characteristics was obtained. This material failed to react with oxygen at 675 C to yield uranium hexafluoride; however, at 750 C some reaction occurred. This behavior again exemplifies the great variation in the reactivity of the starting material as a result of its history.

Calcium fluoride and uranyl fluoride were used as diluents in an attempt to minimize the side reactions believed due to the attack of UF_6 on unreacted UF_4; however, neither compound was effective in increasing the UF_6 yield.

DECLASSIFIED

TABLE V

REPRECIPITATION OF SODIUM URANIUM FLUORIDE - EFFECT OF PROCESS VARIABLES ON THE IRON DECONTAMINATION AND TAP DENSITY

Run	Precipitation Procedure	Iron Content ppm Uranium	Fe D.F.	Tap Density g/cc
3-I	Addition of 800 ml 0.31 M $U(SO_4)_2$, 0.63 M Na_2SO_4 and 1000 ml 1.5 M HF concurrently to 500 ml water with stirring.	125	27	0.8
3-II	Addition of 800 ml 0.31 M $U(SO_4)_2$, 0.31 M Na_2SO_4 and 1000 ml 0.5 M HF concurrently to 500 ml 0.25 M Na_2SO_4 with stirring.	84	40	0.63
3-III	Addition of 700 ml 0.357 M $U(SO_4)_2$ and 875 ml 1.72 M HF concurrently to 700 ml 0.36 M Na_2SO_4 with stirring.	70	47	1.6
3-IV	Addition of 850 ml 0.29 M $U(SO_4)_2$ and 1060 ml 1.41 M HF concurrently to 500 ml 1 M NaCl.	90	37	1.75
3-V	Like 3-III except precipitation performed at 70-80 C.	100	43	0.7

- - - - - - - - - - -

Notes: Addition rate for each solution was 500 ml/hr. Temperature was ambient except for 3-V. Each precipitate was washed thrice with 500 ml portions of 0.1 M HF, 0.05 M Na_2SO_4 or 0.1 M HF, 0.1 M NaCl, twice with absolute ethanol, twice with petroleum ether and dried 24 hrs. at 110 C. The uranium solution for runs 3-I through 3-IV was derived from run 2-I, for run 3-V from run 2-II. The methathesis was accomplished by stirring 0.25 mole of $NaUF_5$ with 1000 ml of 1.25 M NaOH; upon cessation of stirring greater than 99.9 percent of the solid immediately settled out. The decantate was washed once with 500 ml of 0.05 M NaOH, then dissolved in 600 ml of 1.05 M H_2SO_4. The resulting solutions contained less than 0.1 M excess H_2SO_4.

As a more representative approach to the problem, a vertical solid bed reactor will be utilized in further studies.

UO_3 Studies

The surface areas of about forty selected samples of UO_3 and UO_2 have been measured, and the following general conclusions are indicated:

1. The pot calcined UO_3 samples studied had surface areas in the range of 1.1 to 2.1 m^2/g.

2. The surface areas of continuous screw calcined UO_3 were appreciably lower, with 85 percent of the samples below 1.5 m^2/g; the range was 0.6 to 4.5 m^2/g.

3. There is no evidence of correlation between surface area and calcination temperature, sulfate content, or "reactivity test" results.

4. Hot slurry hydration (100 C) of continuous calcined powders affects the surface area in a manner that varies with the temperature of denitration:

   a. UO_3 denitrated at 210 to 295 C hydrated with a reduction of surface area to about one-half that of the parent UO_3.

   b. Powders denitrated at 350 C suffered no appreciable change of surface area upon hydration.

   c. Powders denitrated at 450 C hydrated with a 2 1/2-fold increase in surface area.

Continuously screw calcined powders are milled to pass a 200-mesh sieve prior to the surface area measurement. Since the vacuum outgassing pretreatment in the surface area method causes dehydration of hydrate UO_3 samples, the surface areas of such materials are actually measured on an anhydrous sample.

In measuring the effects of hydrogen reduction of UO_3 to UO_2, it was found the reduction temperature had an unusual effect on the surface area of the product. The following data represent ten samples studied:

AVERAGE SURFACE AREA; m^2/g

	Parent UO_3	UO_2 Reduced at 590 C	UO_2 Reduced at 925 C
Pot calcined	1.53	2.47	0.76
Continuous screw calcined	1.21	3.47	0.69
A hydrated continuous calcined UO_3	7.38	6.36	1.68

DECLASSIFIED

The average particle size (crystal size) of each of six samples of UO_2 was estimated from x-ray diffraction line broadening data and calculated surface areas (assuming idealized particles) agreed within a factor of two with measured values in all cases. Crystal sizes of about 50 millimicrons for 590 C reductions and of 200 to 450 millimicrons for 925 C reductions are typical.

A method for determining absolute densities of powdered samples by gas displacement was tested on known materials and found to be quite usable. A known weight of sample in a volume calibrated tube is used and displacement volume is measured with helium.

A successful replication technique for the electron microscopy of UO_3 powders was developed and several acceptable pictures of UO_3 samples have been obtained. The method consists of forming a palladium plus carbon film over the oxide powder on a microscope slide. After the film is floated off the slide, the UO_3 is dissolved away and the film mounted on a "Formvar" coated grid. Experiments with dissolution agents for UO_2 in order to extend the method to this material are continuing.

ISOTOPE SEPARATION

Thermal Diffusion

Results of the glass packed column run were not promising. After thirteen days operation with a steam temperature of 117 C, a condenser water effluent temperature of -18 C and a heat consumption of 1.6×10^5 cal/min, a barely discernible separation (U-235 content of 0.7123 percent) was observed. Conditions for this experiment were not optimum as the take-off to column volume ratio was high. This is the first known application of a packed thermal diffusion column to the separation of isotopes.

Chemical Exchange

In a continuation of the studies designed to determine the rate of exchange between aqueous uranium and the uranium(IV)-TTA complex in benzene, five more tracer experiments were performed. The following conclusions can be drawn from the experiments so far completed:

1. The rate of exchange between U(IV) aq and $U(TTA)_4$ at pH 1.3 is rapid, with a half time of less than 0.1 hr.

2. The rate of exchange between UO_2^{++} and $U(TTA)_4$ at pH 1.8-2 is slow, the half time exceeding 100 hours.

3. The rate of oxidation of U(IV) in the aqueous phase is fairly rapid at a pH of 1.7-2, but satisfactorily slow at pH 1.3.

As a result of the above findings, a series of batch experiments was designed and performed to determine the extent of isotope separation when $U(TTA)_4$ in benzene is equilibrated with an aqueous phase at a pH of 1.5. Details of the experimental procedure will be reported with the data when the latter become available.

Aqueous Electromigration

A run (No. 14) has been in continuous operation for approximately two months. During this period anolyte compositions were periodically varied until, with a sulfate to sulfosalicylate rate of 0.67, a steady state operation with complete retention of the uranium within the packed section had apparently been accomplished. About two weeks of operation have passed without significant change. One problem still remaining is the control of water which tends to buildup in the packed section by reason of electroosmosis.

Fused Salt Electromigration

Investigations have been continued using the system $-C/LiCl\text{-}KCl/UCl_4/C+$.

"Vycor" high-silica glass (3% B_2O_3) has shown considerably more resistance than quartz to attack by the dissolved alkali metal present in the alkali chloride catholyte. However, one Vycor tube failed in the region of the cathode during its second use and after a total of 67 exposure hours at 600 C.

On the basis of short-duration corrosion tests, zircon porcelain has shown negligible attack by the fused halide mixture and may prove to be an adequate material of construction for electromigration apparatus.

The formation of a white solid material within the packing directly below the anode caused termination of three runs. When the cross-sectional area becomes restricted by formation of this compound, local heating due to the high current density at this point causes vaporization of the UCl_4 and, ultimately the tube becomes completely plugged. Identification of this material by x-ray diffraction is being undertaken.

RUTHENIUM CHEMISTRY

Solvent Extraction Behavior of Ruthenium

Variation of ruthenium extraction coefficients on successive extractions or scrubs, commonly observed in the many empirical studies of ruthenium solvent extraction which have been conducted, suggest the presence of several ruthenium species in any particular system. Accordingly, it is planned to exploit the successive batch extraction technique in an attempt to determine the number and proportion of the various species, their extraction coefficients, the lability or inertness of the species, the effect of total ruthenium concentration on their solvent extraction behavior, and methods for converting one species into another.

[redacted] DECLASSIFIED

One preliminary experiment has been completed in which the behavior of both zirconium and ruthenium was followed on successive extractions of an aqueous phase with 30% TBP. The data are presented in Table VI.

TABLE VI

RUTHENIUM AND ZIRCONIUM EXTRACTION

Aqueous: 1.35 M UNH, 2.0 M HNO_3, 5 g/l $K_4Ru(NO_2)_6$, spiked with 10% HAF from Hot Semi-Works.
Organics: 30% TBP-Soltrol, 1st organic equilibrated with 2.0 M HNO_3, succeeding organics equilibrated with 1.35 M UNH, 2 M HNO_3 (volume ratio, O/A = 3).
Volume Ratio, O/A = 3

Extraction	Zr E_a^o	Ru E_a^o Obsd.	Ru E_a^o Calcd.
1	0.0018	0.0023	0.0023
2	0.0012	0.0011	0.0011
3	0.0013	0.00074	0.00082
4	0.0019	(0.00091)	0.00074
5	0.0015	0.00071	0.00072

Constancy of the zirconium extraction coefficient indicates that zirconium acted as one species and/or a labile group of species(i.e., rapidly interconvertible with respect to the time of experimentation, approximately 30 minutes between extractions). Ruthenium, on the other hand, behaved as two or more species which were inert.

The following equation was derived which gives the total extraction coefficient, E_n^T of the n th extraction as a function of the fraction, F_i, of the total ruthenium initially present as the i th species and its extraction coefficient, E_i, and the volume ratio organic/aqueous, R:

$$E_n^T = \frac{\sum_i \frac{E_i F_i}{(1 + RE_i)^n}}{\sum_i \frac{F_i}{(1 + RE_i)^n}}$$

Applying this equation to the ruthenium extraction data gives

Species	E_a^o	F
1	0.00072	0.994
2	1.0	0.0064

DEL

from which the calculated ruthenium E^T values in the foregoing table were computed. Even without this calculation, the distribution coefficient observed in the fourth extraction was recognized as being out of line and is probably in error. It should be reemphasized that two or more species are indicated. Further resolution of the organophilic species will require more extractions with this species present, e.g., by reduction of the organic/aqueous volume ratio in the initial extractions.

Homogeneous Carrier Precipitation with Mercuric Sulfide

Scavenging of ruthenium by homogeneously precipitated mercuric sulfide has been determined as a function of time in an attempt to explain the unexpectedly low ruthenium decontamination obtained in last month's precipitation-extraction experiment (HW-41702-H, pg. 54). Previously reported data are tabulated along with the new for purposes of comparison:

MERCURIC SULFIDE SCAVENGING OF RUTHENIUM

Solution Composition: 2.1 M UNH, 0.2 M HNO_3, 0.05 g/l $K_4Ru(NO_2)_6$, 0.05 M sulfamic acid, 0.01 M $Hg(NO_3)_2$, 0.05 M thioacetamide.

Precipitation Conditions: Boiling (105 C) with reflux condenser.

Expt.	Ru* Spike Source	Grade Thioacetamide	Ru DF at Indicated Times 15 m	30 m	1 h	2 h	3 h	4 h
1	HSW's HAF	Crude	2300	1700	1750	1.7	1.5	--
2	HSW's HAF	Reagent	1330	780	1300	1.7	1.4	1.0
HW-39751, p. 52	Old Dissolver Soln.	Reagent	--	--	660*	1150*	1.8	1.4
HW-41702, p. 54	Old Dissolver Soln**	Crude	3	---	---	---	---	---

- - - - - - - -

* Corrected values; earlier reported results incorrect by factor of 10 due to analytical error.

**This solution was full level, of course, to permit subsequent solvent extraction behavior study.

These results offer no explanation for the low decontamination value obtained on full level feed; the precipitation-extraction experiment will be repeated.

DECLASSIFIED

[redacted]

DECLASSIFIED

WASTE TREATMENT

Cesium Removal from Purex Waste

The highest specific activity yet obtained by direct precipitation of cesium from Purex waste is attainable by precipitation with zinc ferrocyanide, viz., 16 curies per dry gram of precipitate. Cesium recovery from synthetic neutralized Purex IWW supernate (IWW-NS: 6 M sodium nitrate, 0.05 M sodium sulfate, 4×10^{-4} M cesium) was found to be 93 percent at 2×10^{-4} M zinc and 99 percent at 3×10^{-4} M zinc, with 5×10^{-4} M ferrocyanide in either case. Zinc ferrocyanide was effective over the pH range 2 to 7, with a slight decrease in recovery at pH 8.5. At pH 8.5, best cesium recovery was obtained with a large excess (50-fold) of ferrocyanide, but at pH 4, optimum recovery was obtained at about stoichiometric concentrations, and decreased rapidly with either excess zinc or ferrocyanide. The zinc ferrocyanide precipitate forms somewhat slowly at the low concentrations investigated, requiring about an hour for maximum cesium recovery at room temperature. Heating to 80 C decrased the time for attaining equilibrium to about 15 minutes, but also decreased cesium recovery to 85 percent at 2×10^{-4} M zinc.

Bulk density and washing of the precipitate were checked by adding 2×10^{-4} M zinc and 5×10^{-3} M ferrocyanide to one liter of synthetic IWW-NS. The slurry was adjusted to pH 6.5, allowed to stand for one hour, and centrifuged for 15 minutes. The precipitate, which occupied about 0.5 ml, was washed twice with 10 ml of 0.1 M sodium nitrate, dried overnight at 110 C, and weighed. Overall cesium recovery was about 95 percent, and the precipitate weight of 112 mg corresponded closely to the calculated weight of 104 mg of zinc cesium ferrocyanide plus 4 mg of sodium nitrate (0.5 ml of 0.1 M $NaNO_3$). This, together with the fact that 2×10^{-4} M zinc sufficed for 93 percent recovery of 4×10^{-4} M cesium, indicates that the formula of the precipitate is $ZnCs_2Fe(CN)_6$. This compound contains 49 percent by weight cesium, leaving little margin for further increases in specific activity of cesium precipitates.

Attempts to recover 4×10^{-4} M strontium from synthetic IWW-NS with 0.005 M zinc ferrocyanide resulted in less than 10 percent strontium recovery at pH 2 to 12, inclusive. This indicates that the strontium contamination of the cesium product will be negligible. The following added ions were found to have negligible effect on cesium recovery from synthetic IWW-NS at pH 5 with 2×10^{-4} M zinc and ferrocyanide: 4×10^{-4} M strontium, 4×10^{-4} M rubidium, 0.01 M potassium, 0.1 M sulfate, 0.1 M phosphate, 0.001 M oxalate. Some decrease in cesium recovery was observed with 0.01 M oxalate, and quite poor cesium recovery (only 40%) was observed with 0.1 M carbonate.

In continued efforts to obtain a maximum specific activity product with nickel and other ferrocyanides, about 90 percent recovery of cesium from synthetic IWW-NS was obtained with 5×10^{-4} M nickel and 5×10^{-3} M ferrocyanide. Similar results were obtained with cupric ferrocyanide, but the precipitate was much easier to

centrifuge. Further experiments with nickel and cupric ferrocyanides showed that recoveries are quite similar with either cation or a mixture of the two at a given total cation concentration. However, copper appears to be superior to nickel because of the precipitate characteristics. With either precipitant, a cesium specific activity of 5 to 10 curies per dry gram of precipitate appears feasible.

Other divalent metal ferrocyanides were also investigated with synthetic IWW-NS at pH 5 with 0.001 M ferrocyanide. No precipitate was observed after one hour with 0.002 M magnesium, calcium or strontium. A precipitate was observed with 0.002 M barium, but cesium recovery in the precipitate was less than 10 percent. The minimum concentrations of ferrous, cadmium and manganous ions required for 95 percent cesium recovery were 0.003, 0.001, and 0.005 M, respectively. Thus, only zinc, copper and nickel ferrocyanides merit further consideration. In the zinc cesium ferrocyanide case, investigation of possible radiation damage is planned as well as testing the procedure on a several milliliter scale with actual full-level IWW.

Preliminary experiments on the use of zinc ferrocyanide to remove cesium from HAW resulted in less than 50 percent cesium recovery, even with 5×10^{-4} M zinc ferrocyanide, presumably due to the high acidity. This indicates that zinc is inferior to nickel or ferric ferrocyanide for cesium recovery from Purex HAW.

Ammonium ion was found to decrease cesium recovery from HAW by precipitation with ferric ferrocyanide. This apparent competition with cesium is similar to that previously reported for nickel ferricyanide, possibly due to formation of the compounds $FeNH_4(CN)_6$ amd $Ni\ NH_4Fe(CN)_6$, respectively. In contrast, the action of ammonium ion is complementary with ferric ferrocyanide, i.e., cesium recovery is increased by ammonium ion, suggesting the formation of $NiCsNH_4Fe(CN)_6$.

Strontium Removal from Purex Waste

Continuing study of strontium leaching from hydrous ferric oxide with 0.1 M NH_4NO_3 indicated washing at pH 4 removed activity according to the dilution law, but that some specific retention begins to occur at pH 6. However, even in the absence of specific retention, the volume of wash solution required for adequate removal from the voluminous ferric oxide is very large (over 100 gallons/ton U processed). Accordingly, alternate methods for direct removal of strontium from IWW are under investigation, including carrier precipitation and ion exchange following iron precipitation at low pH.

Using synthetic IWW traced with Sr-Y-90, 78 to 93 percent of the activity remains in the supernate after precipitation of hydrous ferric oxide at pH 5.4-3.2. Because of the relative simplicity of carrier precipitation, this method was first tested on IWW-NS using barium carbonate as the carrier. Recoveries of only up to 70 percent were obtained under the conditions investigated, and the precipitate contained considerable barium sulfate. Therefore, further work on carrier precipitation was deferred in favor of scouting ion exchange methods.

Ion exchange systems for the recovery of strontium from the high sodium concentration of IWW-NS would have to be very selective. Of the several existing possibilities, scouting experiments have been performed with three cationic exchangers and two anionic systems. The cationic systems depend on the direct adsorption of the strontium cation while the anionic systems involve the formation of an insoluble compound with an anion already incorporated in the exchange bed or the adsorption of a complex anion containing strontium.

The most promising results obtained to date involved use of an inorganic ion exchanger, zirconium phosphate, designated as RC-25 and manufactured by Minnesota Mining and Manufacturing Company. Over 99 percent of the Sr-Y-90 activity contained in 5 ml of synthetic IWW-NS was retained in a column packed with 1 ml of RC-25 (0.6 cm diameter x 3.3 cm long). Using similar IWW-NS solution and columns, IRC-50, a carboxylic acid type resin, removed only 25 percent of the activity and Duolite C-3, a phenolic methylene sulfonic acid type resin, removed 60 percent of the activity. The activity was readily stripped from the zirconium phosphate exchanger by dilute nitric acid. Duolite C-3 is attacked by nitric acid, but most of the activity was stripped from this exchanger using a Versene solution. Minimum stripping volumes were not determined in either case. Further experiments will concentrate on the RC-25 exchanger system, in particular on its capacity and elution characteristics.

Using Dowex-1, a quaternary ammonium type resin, experiments were conducted on the adsorption of the strontium-Versene anionic complex onto the chloride-form of the resin and on the precipitation of strontium carbonate onto the carbonate-form. Although the Versene complex was poorly absorbed under the conditions tested; more scouting may be warranted. Promising Sr-Y-90 activity recovery (94%) was obtained with the Dowex-1-carbonate system using a 0.6 x 7 cm column and 5 ml of synthetic IWW-NS. The activity was readily removed from the column with dilute nitric acid without apparent gassing of the column.

Cesium Removal from Redox Waste

A preliminary flowsheet for removing and recovering cesium from neutralized Redox HAW has been successfully tested which involves simply ion exchange followed by carrier precipitation from the elutriant. The cesium recovery is high, the specific activity promising (0.5 curies/gram on the first trial), and no significant increase in stored waste volume results. Radiochemical purity and radiation effects have not yet been examined.

Synthetic HAW (Redox #5, 4×10^{-5} M cesium) was neutralized to pH 13-14 with caustic and the hydrous ferric oxide precipitate centrifuged out. The supernate was then passed through a PMS-type resin (Amberlite IR-100-Na) column (0.4 x 4.5 cm). The average cesium decontamination factor for passage of the first sixty column volumes was 250, equivalent to a recovery of 99.5 percent. After water washing the column, it was eluted with 8 percent citric acid solution brought to pH 8 with ammonium hydroxide. Cesium recovery was quantitative as

indicated by VGM reading of the resin column following elution with 25 column volumes. Cesium carrier precipitation from the elutriant was then achieved by addition of 0.001 M each of ferrocyanide, zinc and nickel ions. The nickel was added after zinc ferrocyanide failed to precipitate within a few minutes. Cesium recovery by the ferrocyanide precipitation was 99.4 percent, giving a precipitate whose volume was less than 0.2% that of the original neutralized HAW supernate. The weight of the precipitate corresponded to a product obtainable from actual HAW having a specific activity of approximately 0.5 curies per dry gram. Continuing study will emphasize the elution and carrier precipitation steps in an attempt to reduce their volume and weight, respectively.

Ruthenium Recovery

Attempts to electroplate ruthenium directly onto copper or gold foils from Purex IWW, partially neutralized to 3 M acid, were unsuccessful. A thin deposit of ruthenium did appear on the copper but the copper cathode corroded badly. In the gold case, adding sodium nitrite to the IWW did not help. Even under ideal conditions, i.e., from synthetic plating solution not containing the impurities and compounds formed in normal processing, the ruthenium plated at a rate of only 0.1-0.3 mils per hour. The required thickness for radiation sources is expected to be tens of mils. In view of these difficulties and those previously reported with electroplating in the ruthenium-copper system, attention is being directed toward carrier precipitation and other separation methods for recovering ruthenium from IWW or dissolved copper sulfide.

ANALYTICAL DEVELOPMENT

Studies of methods for precision titration of plutonium by coulometry continued with a study of potentiometric end point detection methods and other variables which affect precision. In titrating a standard dichemoate solution as a stand-in for plutonium, a reproducibility of ± 0.2 second (0.1 percent of a 200 second titration for example) was obtained although an unexplained systematic error which was influenced by the amount of sample dilution was detected.

Studies of separations methods which may be adapted to automatic in-line analysis for plutonium in first cycle wastes continued. In order to collect basic data, the chelation of ions of plutonium, americium, thorium (UX_1), and several rare earths and fission products by TTA is being systematically investigated. These data should provide the basis for separating plutonium from americium and fission products from UX_1. In addition, the spectrophotometric properties of the plutonium-TTA complexes are being measured in order to form the basis for a possible colorimetric method for plutonium at low concentrations. A TTA concentration of 0.1 M in orthodichlorobenzene has been selected as the preferred extractant. Extraction curves as a function of pH have been established for Pu(IV), Th(IV, Y(III), and Sr(II). Simple methods for the control of pH and of valence state of plutonium are important problems to be solved.

DECLASSIFIED

In order to help understand the mode of radiation induced decomposition of TBP, a measurement of the appearance potentials of TBP in the ionization source of a mass spectrometer is being made. Upon gradual reduction of the ionization potential in one run, the following TBP ion peaks disappeared in this order: m/e 47, 58, 41, and 97. The data are incomplete at present.

Miscellaneous activities included assistance to analytical service groups on analytical methods for nitric acid, the completion and issuance of a Maintenance and Service Manual for the Mark II X-ray Photometer, and engineering assistance for fabrication of a micro-turbidimeter for pile water treatment studies. In addition, a linear rectifier for low voltage AC was developed, which uses a common collector operated transistor. The device is being applied as a means of converting the nonlinear AC output of an amplifier to a linear DC signal which can then be directly fed to a strip-chart recorder.

Fission Counter

Acting on a suggestion by L. M. Bollinger of the Argonne National Laboratories, the use of a diode as a pre-discriminator in the fission counter pre-amplifier was tested. The dynamic characteristics of Sylvania 1N-34 and 1N-38A germanium diodes, Hughes HD-6003 silicon diodes and Transitron S-6 silicon diodes were tested and the S-6 diodes were uniformly good prediscriminators. Using the S-6, it was found that the pulses from alpha interaction are attenuated 10 to 1 while the pulses in the fission range are attenuated less than 5 percent. In addition, the diode stretches the fission pulse duration from about 0.1 microsecond to 2 microseconds and subsequent amplification is thereby simplified.

Using the above electronic system, several scintillation systems for fission counting were compared and the data are summarized in Table VII.

TABLE VII

COMPARISON OF SCINTILLATION SYSTEMS FOR FISSION COUNTING

Scintillator	High Voltage Required for Equal Fission Pulse Height (Volts)	Optimum Spacing: Foil to Photo-multiplier (inches)	Decay Time Millimicroseconds
Tetraphenyl, Butadiene* and Argon	1455	1/4 to 1/2	10
Argon plus 20 percent N_2	1550	1/4 to 1/2	20
Argon plus 2 to 7 percent N_2	1450	1/4 to 1/2	100
Helium plus 0.2 percent N_2	1440	2	40

* 1,1', 4,4' - tetraphenylbutadiene - 1,3 plus polystyrene coated on photo-multiplier tube face.

The scintillation systems included are those which appeared to be preferred on the basis of previous studies. Although the use of the tetraphenylbutadiene phosphor leads to the best resolution, the difficulty of preparing uniform and identical phosphor coatings on each of several tubes discourages its use in a multiple chamber fission counter installation. The lower voltage requirements are in favor of the A-N_2 (below 7 percent) and He-N_2 systems.

The slope of the fission plateau, measured as percent change in counting rate per percent change in pulse height, is 0.2 for the gas scintillators and 0.3 for an ionization chamber. All gas scintillation counter systems tried yielded the same fission plateau slope, indicating that the slope is due to the energy distribution of the fission fragments rather than any variable in the counter operation.

IN-LINE ANALYSIS

The development of a method for the automatic in-line analysis for the acidity of uranium-bearing solutions is continuing. A method based on solution conductance has proved to be very sensitive to nitric acid concentrations. The laboratory values are reproducible to ±3 percent at 2 M HNO_3 in 1.5 M UNH solutions. The usable range of frequency for the conductance measurements is 500 to 50,000 cps, and the cell voltage drop is less than 0.1 volt. The cell constant is made as high as possible. A study of combination measurements of conductance, capacitance, and dielectric constant as functions of frequency, electrode voltage and electrode current was made in order to obtain a determination of both HNO_3 and UNH concentrations with one device, but the results indicated that uranium determinations by means of such an measurement are not practical. Further studies are being concentrated on various electrode materials, effects of possible interfering ions, and on practical methods for simplifying the measuring apparatus for automatic, continuous monitoring.

The development of an automatic in-line photometer for monitoring dichromate in streams corresponding to the Redox 2AF was completed through the laboratory prototype stage, and the details are reported in document HW-42105. By means of a study of the spectrophotometric properties of the 2AF stream, optimum optical filter and cell characteristics were designed to minimize the interferences and provide a working range of 0.01 to 0.14 M dichromate. At flowsheet 2AF concentrations, the influences of Cr(III), Fe(III), and nitric acid on the dichromate photometer reading are an enhancement of about 2, 20, and 4 percent of the dichromate reading, respectively. However, the absorptive effects of these ions are reduced by incorporation of each ion into the standards in flowsheet concentrations. Therefore, at the flowsheet dichromate concentration, the errors introduced by ± 10 percent changes of Cr(III), Fe(III), and nitric acid would be only about ±0.3, ±3.0, and ±0.5 percent, respectively, of the dichromate value. Normally, stream variations of nitric acid will be more than ±10 percent. The design characteristics of the sensing unit are well established, and the operating console is the same as that of the Model III uranium photometer.

DECLASSIFIED

The effect of the variable nitric acid concentration of the HAF make-up sample on in-line uranium photometer results was investigated, and it was found that the uranium value may be in error by eight percent at the maximum variation of nitric acid concentration.

A formal report describing the development of in-line uranium photometers was issued as document HW-39926, and an instruction manual for the shop fabrication of the Model II uranium photometer sensing units is being issued as document HW-40889.

The validity of organic color corrections to uranium photometer readings was checked by collecting some samples of plant solvent from the Hot Semi-Works for spectrophotometric testing in the laboratory. The method of making the corrections was found to be accurate although frequently the correction is small and insignificant. The Model III uranium photometer, which is being used currently on the HAP stream has about 30 percent less sensitivity to the organic color than the Model II units.

Because fluorothene-coated gamma monitor cells have been much less satisfactory on the HAP stream than on the 1AP stream in the Hot Semi-Works, a check of possible radiation damage was made using the Co-60 source. An 18-hour gamma irradiation of 3×10^{19} ev per ml-hour resulted in severe peeling of the fluorothene-on-glass film, indicating a possible cause of the difficulties in Hot Semi-Works' streams. In order to explore a possible solution to this problem, Chemical Development personnel have arranged to have some molded fluorothene cells made at ORNL for test purposes.

A heated-platen press was set up and techniques established for making laminated screens with zinc sulfide phosphor and plastic films for alpha counting in corrosive solutions. Kel-F, zinc sulfide phosphor, Teflon film sandwiches have been made with good bonding to a glass backing plate, but discoloration and degradation of the phosphor have been common in many cases.

LABORATORY SERVICES

Laboratory Services activities may be summarized as follows: 130,000 gallons of crib-level waste was transported to 200 West Area for disposal. Average plutonium analysis was 3.4×10^{-4} uc/ml; average gross beta analysis was 9.0×10^{-3} uc/ml.

Approximately 3,000,000 gallons of retention-level waste was discharged to the 300 Area pond. Average alpha analysis was less than 4.5×10^{-7} uc/ml; average beta analysis was less than 8.0×10^{-7} uc/ml.

Decontamination personnel made six trips to the 300 North Burial Ground with hot waste from the 327 Building. Readings on the "gunk catchers" were approximately 5 rads at a distance of 6 feet. Four barrels, containing hot waste, were concreted

and hauled to the 300 North Burial Ground. Readings on these were approximately 2 rads at the surface.

On the weekend of the 3rd and 4th of March, an unusual amount of cribbing waste was received. Both tanks were filled, causing a flooding of the off-gas system. Gas pressure was created in the tanks and escaped through the sampling port, and possibly through the eductor line. The odor of the gas resembled that of hydrogen sulfide. This was offensive enough to keep the operators from entering the room momentarily. The waste solution was neutralized by the addition of caustic, and the evolution of gas ceased. The only contamination encountered was in the drain cock of the off-gas blower. Decontamination personnel worked approximately 30 hours overtime to keep the cribbing waste system operating.

All other decontamination, building services, and laundry functions were completed in a routine manner.

DECLASSIFIED

ANALYTICAL LABORATORIES UNIT - E. W. CHRISTOPHERSON

General Chemical Laboratory

Major effort consisted of support given to Chemical Development Sub-Section studies performed in the 321 Building.

Overtime is being utilized to reduce a backlog.

Radiochemical Laboratory

Sound chemical separation methods for individual fission products in aqueous systems have been available for years. With the advent of solvent extraction most of those methods were found to apply surprisingly well to separation of fission products in various organic systems. Problems like explosion hazards and failure to get exchange did and still arise from time to time; however, the discerning analyst has generally been able to adapt existing methods suitably. For some time separations have been unsatisfactory for 1000 c/m/ml level Nb* and Zr* as they occur both in 30% TBP-hydrocarbon diluent and TTA-benzene systems. For either case exchange has been inadequate due to poor admixing of aqueous carrier and sample. The following simple devices were this month found beneficial:

(1) Addition of CCl_4 to TBP systems improved admixing by causing the organic phase density to exceed that of the aqueous phase and subsequently increasing the effectiveness of the standard magnetic stirrer type agitation.

(2) Benzene was distilled and TTA was readily decomposed with $KClO_3$ prior to Nb* separation and, H_2O_2 prior to Zr* separation.

Similarly, the following modifications have been used for some time:

(1) Hexone is readily removed by steam distillation prior to use of $HClO_4$ as required by Cs* and Ru* separations. For the recently installed HIO_4 method for Ru*, Laboratory studies indicate that up to 0.100 ml of hexone is neither a chemical interference nor a safety hazard.

(2) When required, TBP and diluent may be decomposed with fuming H_2SO_4 and H_2O_2 used alternately.

(3) For more than 0.05 ml samples of 30% TBP-hydrocarbon diluent, Ru* separation by direct reduction works more or less poorly due to passivation of magnesium metal pellets (used to reduce Ru chlorides to weighable Ru metal) with a coating of TBP solution. The Laboratory has found that regulated acetone-ether additions sufficiently change the properties of the organic phase to preclude coating of magnesium.

(4) Recuplex solvent interferes with Pu separations since the dense organic solution is not readily washed out of such precipitates as LaF_3. The density, however, is suitably altered by the addition of hydrocarbon diluent.

The non-destructive method of measuring U-235 content of slugs (before irradiation) by gamma spectrometry (HW-39969) has been confirmed and preparatory steps have been taken for supplying such measurements to Physics Research for slugs both spiked with plutonium and deficient in U-235 corresponding to exposures up to 4,000 MWD.

Pile irradiated xenon was found by gamma spectrometry to contain only Xe-125 although natural xenon contains parent X-124 to the limited extent of some 0.1%. A high cross section is indicated. Since the literature appears blank on the subject an Xe-124 cross section estimate will be made.

Vacuum fusion was successfully used to separate impurity gasses from high purity plutonium for mass spectrographic evaluation. The system performed satisfactorily and resulted in minimum spread of contamination. At operating conditions including graphite crucibles and a 1900°C temperature, a platinum bath was found to be superior to the iron-tin bath (customary for zirconium) as follows:

(1) More samples may be run in unit bath volume since platinum does not solidify due to carbide formation.

(2) Clean-up is simplified because very little metal volatilizes. With the iron-tin bath considerable amounts of metals volatilize and condense along two feet of quartz tubing immediately above the crucible. That metal must be chemically removed from time to time to insure against gettering of gases subsequently evolved.

(3) Results are more uniform. At the 150 ppm O_2, 6 ppm H_2, and 9 ppm N_2 level of the plutonium samples analysed, estimated ppm errors were $\pm$ 10, $\pm$ 3, and $\pm$ 2, respectively, with use of the platinum bath.

Regular use of a platinum bath is planned for plutonium and is to be evaluated for use with zirconium.

Spectrometry Laboratory

Mass spectrometers operated without down time. Work load increased due to further 1706 KE recirculation demands and to various special requests. Resulting from extensive down time for the 222-S mass spectrometer, several plant product U-235 assays were supplied to the Analytical Control Sub-Section. U-235 assay requirements for the Chemical Research isotope enrichment programs continue at a steady rate. Nitrogen estimation in zirconium metal off-gas (vacuum fusion product) shows some uncertainty. Since current zirconium metal is relatively high in O_2, the off-gas is preponderantly CO whose 28 mass peak is essentially the same as the principle N_2 peak. For N_2 estimation one must then rely upon the relatively unabundant nitrogen 14 peak. Secondly, heterogeneous nitrogen distribution through zirconium metal is at least indicated. Nitrogen assay by the standard Kjeldahl method is planned.

DECLASSIFIED

UO_3 and a few UO_2 surface area measurements are being made at a rate of four per day.

The Water Quality Laboratory work load was similar to the load of last month.

As a part of utilizing emission spectrography for routine analyses of metals in KAPL-120 water, preliminary Fe, Cr, Ni, and Zr standard curves were prepared.

Work volume statistics are as follows:

	FEBRUARY*		MARCH	
	No. of Samples	No. of Determinations	No. of Samples	No. of Determinations
Research & Development				
Pile Technology				
Metallurgy Research	75	994	115	395
Physics Research	-	-	68	69
Pile Materials	2035	4111	761	2709
Fuel Technology	53	861	50	655
Separations Technology				
Chemical Research	960	1680	921	1696
Chemical Development	358	1242	534	1257
Plant Processes	22	65	5	35
Process Technology	565	1901	384	1090
Other Customers	180	874	194	962
Total	4248	11728	3032	8868

* Work loads for the two months are about equal. February figures appear high because five weeks are represented due to peculiarities of the system for collecting statistics.

TECHNICAL SHOPS UNIT - L. J. LUCAS

Mechanical Shops

The work backlog continued at the 10,500 hour level which is equivalent to one crew month. This level is higher than the optimum level but with extensive scheduling the shop was able to meet the major commitments.

Equipment received included a sheetmetal power shear which is replacing a worn obsolete model and an electron drilling machine. This machine is used to drill regular or irregular shaped holes in carbides and like material. Used as a salvaging machine it becomes a valuable tool in the removal of broken taps, drills, or cutting tools from work which would otherwise be considered scrap.

Buildings and Grounds

IR-200, Graphite Machining Facilities. Bid requests were issued on March 27, 1956.

ER-3133, Alterations of 325 and 326 Buildings. The scope of the work has been revised to modify the south portion of proposed balcony (326 Building) to provide a personnel entrance. The original estimate is being revised.

WO-A15613 (CC-8826), Construction of Cylinder Loading and Storage Dock. Material has been ordered against this work, and the excavation has been done for the footings. The work has been suspended because of the strike against the J. A. Jones Company.

Technical Shops Safe Procedures Forum - Paints and Protective Coatings. A two-fold effort has been made to obtain either an expert or expert information relative to the safety hazards of coatings. As a result of our search the Separations Equipment Development Unit has undertaken a long term study of the problem and the Safety and Fire Prevention Unit has contacted the Consultant, Safety Services, of the New York Office.

Hot Laboratory Information Committee. During this month two important developments took place relative to this committee; (1) the Fifth Symposium was rescheduled for March 1957, and (2) the A.E.C. directive letter was received authorizing work on the new national edition of the Hot Laboratory Equipment Catalog.

Propane Storage Tank - Building 3726. Notice was received from the Safety and Fire Prevention Unit that the tank had been condemned by the Travelers Insurance inspector. Steps were initiated to procure a new tank rather than to attempt to bring the other tank into conformity since such work would interrupt the propane service for a considerable period.

Drafting and Design

Total productive man hours for the month was 2959 including 112 hours overtime. This included the productive time of two personnel on loan from the Graphics Unit and one man from the Design Section.

The backlog of work remains high requiring considerable shifting of personnel to meet the more urgent projects. No new applications were received by the Employment Unit in response to the newspaper advertisements recently placed in the South Eastern section of the U.S.

Glass Shop

Total productive man hours for the month was 978 with no overtime work necessary. Outstanding jobs encountered included the fabrication of glass coils 5-3/8" O.D. x 12" long with an uncoiled length of 28'. Special heating arrangements had to be devised and the sequence of operations carefully planned.

Photo Laboratory

A normal work load was experienced with all requests for service being met promptly.

CONTACT ENGINEERING UNIT - RE Tomlinson

All of the material required for the fabrication of the prototype calciner are now on site and assembly is approximately 85% complete. Progress was h[illegible]ed at month's end by a strike involving construction personnel.

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 March, 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
H.T. Hahn	The Separation of the Isotopes of Uranium
W.L. Lyon	A Process for the Conversion of Uranium or Plutonium Metals to the Corresponding Anhydrous Halide Salts
G.B. Barton, W.H. Adams, and G.E. Benedict	Use of Versenes to Improve Fission - Product Decontamination in Solvent Extraction Processes.
R.L. Moore	Suppression of Chloride Volatilization in Nitric Acid Distillation
R.L. Moore	Suppression of Fluoride Volatilization in Nitric Acid Distillation
U.L. Upson	A Scintillation Screen for the Detection of Radiation in a Corrosive Environment
T.R. Cartmell	A Linear Transistor Rectifier for Low Voltage Alternating Currents
H.H. Van Tuyl	The Precipitation of Cesium as Zinc Cesium Ferrocyanide.

R. B. Richards
Manager, Separations Technology
ENGINEERING DEPARTMENT

MONTHLY REPORT
DESIGN SECTION

VISITORS AND BUSINESS TRIPS

A. Webber of the Bristol Company, Seattle, Washington visited Hanford March 2nd to observe flow monitoring prototype tests in the 3707-C Instrument Development Laboratory.

R. J. Marmorstone of Panellit, Incorporated, Skokie, Illinois visited Hanford March 5th to assist in testing of zone temperature monitoring prototypes in the 3707-C Instrument Development Laboratory; and to inspect pressure and temperature monitor equipment.

C. S. Slenning of the Minneapolis-Honeywell Company, Richland, Washington and F. B. Akerson of the Minneapolis-Honeywell Company, Portland, Oregon visited Hanford March 7th to inspect new moisture monitoring recorders.

E. G. Putnam of Nickum and Sons, Architect-Engineers, Seattle, Washington visited Hanford March 8th to inspect construction site for Purex silica gel facility.

D. E. Stephens of the Fischer-Porter Company, Hatboro, Pennsylvania visited Hanford March 5th thru 9th to demonstrate a prototype differential pressure flow monitor.

J. B. McFerran of General Engineering Laboratory, Schenectady, New York visited Hanford March 7th thru 8th to review flow monitoring equipment requirements.

E. H. Wakefield of Radiation Counter Laboratories, Skokie, Illinois visited Hanford March 9th to inspect gamma monitoring instruments.

D. Thompson and W. Fish of Arnoux Company, Los Angeles, California visited Hanford March 9th to demonstrate a pre-prototype temperature monitor.

M. F. Parr of Foxboro Company, San Leandro, California visited Hanford March 16th for consultation on field maintenance problems of Foxboro equipment.

J. G. Kirwan of Westinghouse Electric Corporation, Portland, Oregon visited Hanford March 26th to discuss application of various types of protective relays on electrical systems.

E. Nuber of Bristol Company, Waterbury, Connecticut visited Hanford March 26th to deliver a flow monitor.

C. P. Irwin of Ingersoll Rand Company, Seattle, Washington visited Hanford March 28th to assist in testing of controlled-torque impact wrenches.

A. H. Smith of Allegheny-Ludlum Steel Corporation, Seattle, Washington and W. J. Baldwin of Allegheny-Ludlum Steel Corporation, Los Angeles, California visited Hanford March 28th to discuss stainless steel requirements.

DECLASSIFIED

R. K. Bollinger visited the Instrument Laboratory, Incorporated, Seattle, Washington to discuss technical details of Zone Temperature Monitor system and Electric Steel Foundry, Portland, Oregon to consult on instruments for reactor plant modifications, February 29th thru March 2nd.

W. A. Richards visited Bumstead-Woolford Company, Seattle, Washington for inspection of completed 190 Building Graphic Control Panels for Project CG-558, and American Phenolic Corporation, Seattle, Washington to consult on Zone Temperature Monitor connector problems, March 9th.

E. M. Johnston visited the Graver Tank Company, East Chicago, Illinois March 12th to discuss fabrication details and inspect shop facilities.

J. P. Corley visited the Union Carbide Nuclear Company, Oak Ridge, Tennessee March 12th thru 14th to consult on cooling tower operating experience.

H. C. Ellsworth visited Bumstead-Woolford Company and Coates Electric Company, Seattle, Washington March 14th thru 15th to discuss graphic panels for 190 Building.

E. L. Reed attended the ASME-AIEE 4th Annual Management Conference, St. Louis, Missouri March 14th thru 15th.

E. R. Rudock visited Pacific Oerlikon Company, Seattle, Washington March 16th to approve test equipment for venturi assemblies.

T. W. Jeffs attended the American Power Conference, Chicago, Illinois March 18th thru 24th.

E. Hollister, A. R. Skaran, L. E. Kusler, V. R. Hill, C. A. Rohrmann, A. B. Carson, D. W. McLenegan, R. S. Peterson, D. Marinos and J. R. Carrell attended the ASME Regional Meeting, Portland, Oregon March 19th thru 20th. V. R. Hill acted as moderator for the Junior Committee Nuclear Session. The following papers were presented:

C. A. Rohrmann - "Process Engineering Problems in the Hanford Separations Plants"

A. B. Carson - "Design of Graphite Moderated Power Reactor"

D. W. McLenegan- "Professional Development - The Importance of Early Planning".

G. R. Hosack visited the General Electric Company, Lynn, Massachusetts and Baldwin-Lima-Hamilton Corporation, Cambridge, Massachusetts March 20th thru 21st to discuss test equipment for field test of centrifugal pumps; General Electric Company, Schenectady, New York and DeLaval Steam Turbine, Trenton, New Jersey March 22nd thru 23rd to inspect drive equipment manufactured by General Electric for 105 Building process pumps.

G. L. Davis and E. L. Reed visited Savannah River Project March 12th thru 13th to discuss new fuel element fabrication facilities and instrumentation developments.

G. L. Davis visited Sylvania Electric Products plants at Bayside, New York and Hicksville, New York on March 14th to view fuel fabrication facilities; Schenectady Wor[illegible] March 15th thru 16th to visit Manufacturing Services in relation to plant layout, plant surveys, and automation laboratory facilities.

ORGANIZATION AND PERSONNEL

Personnel Statistics:	February 29 Exempt	February 29 Non-Exempt	February 29 Total	March 31 Exempt	March 31 Non-Exempt	March 31 Total
Design Management	2	1	3	2	1	3
Process Engineering Sub-Section	73	12	85	73	14	87
Design Planning Unit	17	14	31	16	14	30
Design Engineering Sub-Section	80	10	90	79	10	89
Design Drafting Unit	7	72	79	7	69	76
Total Section Personnel	179	109	288	177	108	285
Rotational Technical Graduates	-	1	1	-	1	1
Total	179	110	289	177	109	286

Accessions - 3

Separations - 6

GENERAL

Design Section effort on all design development programs increased during March, the largest increase being in the Metallurgical Design Development Program. Effort on Design Section managed projects also increased, due primarily to increased activity on Project CG-654, Advance Design - Reactor Plant. Total effort expended during the month on preparation of the Engineering Department submission of the Plant and Equipment Budget for FY 1958 decreased, reflecting completion of most of the required advance engineering studies of potential FY 1958 budget items and issuance of a preliminary budget document. Distribution of effort by major components is as follows:

	Engineering Man Months Expended	Drafting Man Months Expended	% of Section Effort
Design Development Programs	50.0	11.0	26.3
Design Section Managed Projects	70.3	44.2	49.7
Plant and Equipment Budget Preparation	8.4	1.6	4.3
Process Technology	9.2	4.4	5.9
Customer Work	18.8	12.9	13.8
Total	156.7*	74.1*	100.0

*Equivalent man months expended include 248 hours of engineering and 8 hours of drafting overtime, which represents 0.4% of the Section based on the total available hours for a normal 40 hour week.

The Design Drafting Unit production for March was 300 new drawings and 282 drawing revisions for an equivalent of 4.5 man days per drawing.

DECLASSIFIED

DESIGN DEVELOPMENT

The total number of engineering and drafting man months applied to design development activities for March were as follows:

	Engineering		Drafting	
	Man Months	% of Total	Man Months	% of Total
Metallurgical Design Development	6.9	13.8	2.0	18.2
Reactor Design Development	18.0	36.0	0.8	7.3
Separations Design Development	19.5	39.0	3.1	28.2
Chemical Processing & Reduction Design Development	2.6	5.2	0.9	8.2
234-5 Design Development	3.0	6.0	4.2	38.1
Total	50.0	100.0	11.0	100.0

Metallurgical Design Development

Several alternates are being evaluated to determine the most feasible method of expanding the canning and autoclave areas of the 313 Building to accomodate additional fuel element production facilities which would be required for a supplementary production reactor. To assist in the development of modifications to canning facilities, a three dimensional scale model of the 313 Building is currently being fabricated. The model will include process equipment, shipping dock, and chemical mixing facilities in the 303-F Building.

A study was completed during the month of the most feasible methods of increasing canning furnace throughput. Induction pre-heating of cans and sleeves, combined with an automatic assembling unit was the method which was recommended.

Other metallurgical design development studies which were active during March include improved control of fumes emitted from the pickle and penetration etch machines in the 313 Building, development of methods for radiographing internally-externally cooled fuel elements, and mechanization of present 313 Building operations such as slug box unloading and non-destructive testing.

Reactor Design Development

Studies are in progress to develop supplementary production reactor plant designs which are optimum from the standpoints of cost of production of plutonium, feasibility of construction, and safety of operation. These studies include determination of the economic incentive and engineering feasibility of high temperature (up to 650° F), high pressure operation with water as the coolant, investigation of the utilization of the water wall concept in the design of high pressure, high temperature reactors, and study of the feasibility of a gas-cooled plutonium producing reactor which would utilize uncanned uranium oxide or uranium carbide as fuel. Studies of the plutonium producing possibilities of a homogeneous reactor are also in progress. An interim report on the technical aspects of the application of the homogeneous reactor concept was issued during the month as document HW-42080.

Studies of the application of pressurization and recirculation to the cooling system of existing reactors as a means of achieving increased production capacities have been essentially completed. An interim report (document HW-41298) on pile pressurization was issued during the month. Upon receipt of construction cost estimates for the various cases considered, a report will be issued summarizing the design data, estimated production gains, and estimated construction costs for each of the alternative cases of pressurization and recirculation which were studied.

Other reactor design development effort during the month included investigation of the application of improved drying agents to mixtures of helium and carbon dioxide used in the reactors, evaluation of prototype flow monitoring and temperature monitoring system components, and study of potential sites for new reactor plants.

Separations Design Development

Studies were initiated during March of building and equipment modifications which would be required to provide for a Phase IV capacity increase in the Redox Plant. The study will consist of two phases. The first phase will deal with the changes necessary to match the capacity of the largest practical batch dissolution facilities which could be accomodated in existing cell space. The second phase will deal with the changes which would be required to achieve an ultimate capacity in the Redox Plant of approximately double the Phase II capacity rate, assuming the construction of new dissolving facilities in a separate building.

Preparation of preliminary scope designs for a new separations plant utilizing a simplified Redox process continued during the month. Flow diagrams were issued for comment and work was started on a draft of a report summarizing this study.

Work continued on a study which will provide the scope basis for an additional crane in the Redox Plant. Emphasis is being placed on the provision of a small (5 ton capacity) crane to be used for dissolver charging operations only.

A scope study was completed for the replacement of the present Purex 1A Column, and a study drawing was issued for a new column designed to improve the zirconium-niobium decontamination performance of the Purex Plant.

A detailed study was initiated of the service history of electric pot agitators in the 224-U Building, with the objective of providing a basis for the scope of an improved agitator design.

Chemical Processing and Reduction

Development work continued during the month on the replacement of Task II equipment with continuous Task I - Task II equipment in the 234-5 Building. All study drawings except the engineering flow diagrams have been completed and issued for comment. The EFD's are scheduled for issuance early in April. Based on the study drawings, calculations are being made of the shielding requirements of the continuous Task I - Task II equipment, and critical mass characteristics are being studied.

DECLASSIFIED

234-5 Design Development

234-5 design development effort during March included completion of the design of a prototype manually-operated vacuum pick-up device for handling coated or uncoated pieces, completion of a scope drawing showing the arrangement of a mechanical stripping device for removing jackets from coated pieces, completion of a scope design for a remotely operated briquetting press, and issuance of document HW-41628, "Special Metal Turning Lathe for Task V of RM Line", which describes the scope for a remotely operated final shape machining lathe.

Other 234-5 design development activity for the month included continuation of studies of mechanization of operations in the final inspection and mating facilities, and preparation of detailed drawings for the fabrication of a prototype transfer can for transporting material from one hood to another through the Zone III area of the RM Line without the use of a plastic bag.

Engineering Standards and Materials Development

Status of engineering standards at the end of March was as follows:

a. HW-5039-S, Rev. 2 - Standard Specification for Marking Stainless Steel - 80% complete.
b. HWS-8001-S - Standard Specification for Metal-Clad Switchgear, 600 Volt - 95% complete.
c. HWS-8005-S - Standard Specification for Metal-Clad Switchgear, 4.16 and 13.8 KV - 90% complete.
d. HWS-8062-S, Rev. 2 - Standard Specification for Austenitic Stainless Steel Bars and Structural Shapes - 80% complete.
e. HWS-8061-S, Rev. 2 - Standard Specification for Austenitic Stainless Steel Plate, Sheet and Strip - 80% complete.
f. HWS-8063-S, Rev. 2 - Standard Specification for Stainless Steel Castings - 80% complete.
g. HWS-8064-S, Rev. 2 - Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipe - 80% complete.
h. HWS-8065-S, Rev. 1 - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubes - 80% complete.
i. HWS-8066-S, - Standard Specification for Factory-Made Austenitic Stainless Steel Welding Fittings and Flanges - 70% complete.
j. HWS-8067-S, Rev. 1 - Standard Specification for Austenitic Stainless Steel Welding Electrodes and Filler Materials - 75% complete.
k. Other Specifications in progress include:
   (1) Jumpers prepared on site,
   (2) Non-Code Vessels Prepared on Site,
   (3) Off-Site Fabrication of Replacement Vessels for Class I-A Service - 200 Area Non-Code, and
   (4) Replacement Agitators and Pumps for 200 Area work.

DEL

PROJECTS, PROCESS TECHNOLOGY AND CUSTOMER WORK

Statistics:

Engineering and drafting effort of the Design Section on projects, process technology and customer work for the month of March was as follows:

	Engineering		Drafting	
	Man Months	% of Total	Man Months	% of Total
Reactor Plant Modifications for Increased Production	10.3	9.7	5.1	8.1
Advance Design - Reactor Plant	24.1	22.6	11.4	18.1
100-K Reactor Plants	3.0	2.8	0.7	1.1
Continuous Charge-Discharge Equipment C Reactor	4.9	4.6	4.1	6.5
Purex Radioiodine Removal Facilities	6.6	6.2	6.0	9.5
Redox Radioiodine Removal Facilities	4.4	4.1	4.5	7.1
Hanford 4X Program	5.1	4.8	1.6	2.5
Other Design Section Managed Projects	11.9	11.1	10.8	17.1
Plant and Equipment Budget Preparation	8.4	7.9	1.6	2.5
Process Technology	9.2	8.6	4.4	7.0
Customer Work	18.8	17.6	12.9	20.5
Total	106.7	100.0	63.1	100.0

FY 1958 Plant and Equipment Budget

Preparation of the Engineering Department submission of the Plant and Equipment Projects Budget for FY 1958 and Revision of Budget for FY 1957 continued during March. A preliminary budget summary and a preliminary project budget data sheet document (HW-42059, Parts I and II) were issued during the month for review by the Using Department managers before final submission to the Financial Department.

CA-512 - 100-K Area Facilities

Work continued during the month on CA-512, Revision 4, which includes the modification and installation of various facilities for the satisfactory completion of the 100-K Reactor Area. During the month, design of Gamma Water Monitoring Facilities advanced to 92% complete. Other design effort included completion of drawings and requisitions required for the relocation of front face tubing in the 1706-KER Recirculation Facility

CA-513 - Purex Separations Facility

Detailed design was started during March for a replacement 1A Column for the Purex Facility.

CG-558 - Reactor Plant Modification for Increased Production

Detailed design for all phases of Project CG-558, Reactor Plant Modification for Increased Production, was completed in February. Design effort during March was limited to design field liaison.

DECLASSIFIED

Design and installation of Zone Temperature Monitoring Facilities for 100-B, C, D, DR, F and H Areas, formerly a part of Project CG-558, is now being done as Project CG-666.

CG-600 - 100-C Alterations

The design completion status for Project CG-600 was 98.5% at the end of the month. Two check prints for the installation of new process pumps in the 190-C Pump House were prepared during March.

CG-613 - Hanford 4X Program - Metal Conversion Plant

With the exception of design of the Maintenance Shop, which is being done by Nickum and Sons, Architect-Engineers, detailed design for the UO_3 Plant modifications was completed in February. Design of the Maintenance Shop was 50% complete at the end of March.

Design Section activities during the month included review of preliminary plans and specifications for the Maintenance Shop, prepared by the Architect-Engineer, for conformance with approved scope, and the furnishing of design assistance to lump sum contractors for the installation of various equipment items such as differential pressure transducers.

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

Based on a revised design progress schedule for Project CG-616 which was transmitted to HOO-AEC on March 27, 1956, detailed design for the installation of acid feed equipment in the 100-B, C, D, DR, F and H Areas was 84% complete at the end of March. The revised design progress schedule reflects recent major changes in the scope of acid addition facilities, and the necessity of deleting all references to activated silica facilities on the combined drawings which were being prepared for Projects CG-616 and CG-638.

CG-621 - Redox Contamination Control Facilities

Detailed design for Project CG-621, Redox Contamination Control Facilities, was completed during the month with the completion of design for the removal of contaminated equipment.

CA-625 - Additional Waste Disposal Facilities - 200 Area

Based on a revised design progress schedule which was transmitted to HOO-AEC on March 2, 1956, detail design was 76% complete at the end of March. The revised schedule reflects the addition of drawings necessary to add circulation facilities as a part of the Phase I 241-SY Tank Farm design, and the elimination of Phase II design from the current official schedule for Project CA-625 pending determination of the timing and the financing of this work.

CG-638 - Alum-Activated Silica Water Treatment Facilities - Phase II

Design of activated silica addition facilities has been suspended pending a decision on the use of an additive other than activated silica (separan) which is currently undergoing in-pile testing. Combined drawings which were being prepared for Projects CG-616 and CG-638 have been revised to delete references to activated silica facilities.

CG-642 - Design of Continuous Charge-Discharge Equipment - C Reactor

Detailed design of full-scale continuous charge-discharge equipment for C Reactor advanced to 13% complete during March. Detailed design was started during the month for charging machine control circuitry.

CG-643 - Redox Capacity Increase - Phase III

Work continued during the month on the preparation of design scope for Redox Capacity Increase - Phase III.

Detailed design is essentially complete for modifications to the 2-E Column and the F-3 and F-6 condensers. A design progress schedule for this project will be prepared when the scope of the total project has been determined.

CG-644 - Silica Gel Tail-End Treatment Facilities - Purex

A design criteria for off-site architect-engineer services for detailed design of silica gel tail-end treatment facilities for the Purex Plant was transmitted to HOO-AEC during the month. Detailed design has been started by the architect-engineer, Nickum and Sons, and was 4% complete at the end of the month. A design progress schedule for Project CG-644 is in preparation.

A draft project proposal requesting total project funds of $490,000 was issued for comment during the month.

CG-646 - Modifications to Pickling Machines - 313 Building

Detailed design for the conversion of slug pickling machines in the 313 Building, 300 Area, from a spray process to an immersion-dip process was 25% complete at the end of March. A design progress schedule for Project CG-646 will be issued early in April.

CG-647 - Back-up Radioiodine Removal Facilities - Purex

Detailed design of back-up radioiodine removal facilities for the Purex Plant advanced to 75% complete during the month. Twenty-one new drawings and ten revised drawings were approved during March.

DECLASSIFIED

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

Detailed design of auxiliary radioiodine removal and nitric acid recovery facilities for the Redox Plant advanced to 85% complete during March. Thirteen new drawings were approved, and the construction specifications required for this project were issued for comment during the month.

CG-653 - Modifications - Redox Cooling Water Disposal

Detailed design of facilities to provide for segregation and separate disposal of Redox process cooling water and steam condensates advanced to 85% complete during March.

CG-654 - Advance Design - Reactor Plant

Pre-scope engineering studies continued during March for the design of a minimum completion schedule new plutonium producing reactor which will be based on the design of the K reactors, modified as necessary for recirculation of pile coolant.

Of a total of 111 pre-scope drawings scheduled, 65 have been started and 42 have been issued to date. During March, 36 drawings were issued for comment.

A project proposal (Document HW-41881) was prepared and transmitted to HOO-AEC during the month requesting authorization of an additional $500,000 for continuation of present pre-scope activities and initiation of full-scale Title I design and some Title II design. The use to which the requested funds will be put is dependent upon the authorization date of procurement funds for Project CG-654. If procurement is authorized by July, 1956, the design activities will be expanded to a full Title I - Title II program. However, if procurement has not been authorized by July, design efforts will be directed toward the preparation of a design package which will include full Title I design and limited Title II design. This design package will provide design for procurement of long-range delivery equipment and preliminary design sufficient for immediate initiation of detailed working drawings.

CG-660 - Modifications and Additions to the Metallographic Cell - Radiometallurgy Building

Detailed design was initiated during the month for equipment modifications and additions to allow resumption of operations on an interim basis in the metallographic cell in the Radiometallurgy Building in the 300 Area. Funds in the amount of $20,000 were authorized late in February for initiation of design and partial procurement for metallographic cell modifications. A revised project proposal requesting authorization of total project funds of $135,000 was completed and routed for Management approval during March.

CG-663 - Steam-Driven Auxiliaries - Buildings 165-KE and 165-KW

Late in March, funds in the amount of $555,000 were authorized by HOO-AEC for the design, procurement and installation of steam-driven auxiliaries and associated equipment in Buildings 165-KE and 165-KW.

CG-666 - Zone Temperature Monitoring - 100-B, C, D, DR, F and H

Detailed design of zone temperature monitoring facilities for 100-B, C, D, DR, F, and H Areas was 31% complete at the end of March. This work was originally authorized in December, as a part of Project CG-558, and was established as a separate project by AEC Directive No. HW-377, dated February 29, 1956.

D.O. 101380 - Shielded Personnel Monitoring Station - Project Proposal (CA-658)

During March, a project proposal requesting $150,000 for the provision of a shielded personnel monitoring station for the Radiological Sciences Department was forwarded to AEC-Washington for approval.

D.O. A-00164 - Flow Loop, 314 Building - Project Proposal (CG-664)

A project proposal requesting $120,000 for the installation in the 314 Building, 300 Area, of a test loop for simulating reactor flow conditions was approved by Management and forwarded to HOO-AEC for approval during the month.

D.O. A-00228 - Metal Loading Facilities - 100-B, D, DR, F and H Areas - Project Proposal (CG-665)

During March, a project proposal requesting $150,000 for the provision of metal loading facilities for the 100-B, D, DR, F and H Areas was approved by Management and forwarded to HOO-AEC for approval.

D.O. A-00283 - Monochromatic Neutron Beam Facility - Project Proposal (CG-672)

A project proposal, completed in February, requesting $112,000 for design and procurement of a monochromatic neutron beam facility for installation in a test hole in one of the 105-K reactors was awaiting Management approval at the end of the month.

D.O. A-00284 - Additional Heat Generation Facility, 189-D Building - Project Proposal (CG-661)

During March, a preliminary project proposal requesting $22,400 for design of additional heat generation facilities for the 189-D Building was approved by Management and forwarded to HOO-AEC for approval.

D.O. A-00320 and A-00321 - Process Technology - Reactor Process Tube Removal Problems

Design Section personnel are participating in a plant assistance program to develop improved methods and equipment for removal of ruptured, corroded or otherwise defective process tubes from the reactors. Specific items on which Design Section effort was expended during the month include the development of a new broaching tool, improvement of nozzle removal and installation methods, and design of additional facilities to provide for the use of multiple crews during tube removal operations.

D.O. A-00355 - Installation of Raw Water Cross-Tie Line - 105-C Building (CG-656)

During March, one drawing was issued for comment and ten purchase specifications were prepared for the fabrication and installation of a raw water cross-tie line for the 105-C Building.

D.O. A-00359 - Mechanical Maintenance Shop Centralization (CA-615)

Preparation of detailed drawings and lump sum specifications was 80% complete at the end of March for Project CA-615, which includes remodeling and relocation of the 1703-B Building, construction of a storage pad and compressor house, and miscellaneous modifications to the 1717-H Shop.

D.O. A-00378 - Semi-Works Facility - Fuel Element Pilot Plant - Project Proposal

Work was initiated during the month on the preparation of a project proposal for the design and installation of a semi-works facility in the Fuel Element Pilot Plant to produce lead-dip processed internally and externally cooled fuel elements.

Design Work Completed During March

D.O. A-00171 - Process Technology - 100-K Reliability Study
D.O. A-00226 - Process Technology - Improved Purex Plant Silver Reactor
D.O. A-00260 - Process Technology - Filtration of Reactor Ventilation Air
D.O. A-00273 - Alterations to Minor Construction Shops - White Bluffs (CG-630)
D.O. A-00329 - Graphite Machining Facilities (IR-200)
D.O. A-00348 - Feasibility Study - Army Gas-Cooled Test Loop
D.O. A-00357 - Tracing of Richland Suburban Tracts
D.O. A-11927 - 300 Area - Modifications to Cap and Can, Sleeve and Etch Machines
D.O. A-18971 - Purex Plant - Miscellaneous Design Assistance
D.O. C-39098 - Heat Exchanger Study
D.O. C-47050 - Structural Analysis for Coal Conveyor - 300 Area
D.O. C-85441 - 2704-Z - Jumper Design
D.O. C-98354 - Purex Plant - Jumper Design

INVENTIONS

All persons engaged in work that might reasonably be expected to result in inventions or discoveries advise that, to the best of their knowledge and belief, no inventions or discoveries were made in the course of their work during the period covered by this report 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	Subject
C. S. Bucholz	A method for mounting cathodic protection anodes in water tanks, including an anode of new design for longer life.

DECLASSIFIED

Design Section

DEC[redacted]

HW-42219 DEL

Inventor	Subject
G. H. Strong	HWIR #682 - High Pressure Process Tube Charging Connection HWIR #683 - Zero Leakage Gas Filled Motor Pump HWIR #684 - Liquid Operated Gas Compressor HWIR #685 - Continuous Charging Machine which can be used with High Temperature High Pressure Systems HWIR #686 - Remote Positioning Apparatus.
N. T. Hildreth	A device for preparing liquid samples and measuring radiation samples and radiation therefrom.
A. R. Skaran	A device for automatically unloading fuel elements from shipping boxes as used in the 313 Building.

J L Boyd

Acting Manager - Design
ENGINEERING DEPARTMENT

OH Greager:HDT:rd

DESIGN SECTION WORK STATUS
ENGINEERING MAN MONTHS

PROCESS ENGINEERING SUB-SECTION:

Description	Authorized Backlog Mar. 1, 1956	Work Scheduled during Month	Time Spent During Month	% of Total Effort	Authorized Backlog Apr. 1, 1956	Schedule of Backlog FY 1956 Apr.	May	June	FY 1957	Anticipated Future Work FY 1957
Purex Modifications	5.1		.1	.1	5.0	1.0	1.0	1.0	2.0	
Reactor Plant Modifications	21.9		1.0	1.4	20.9	2.0	1.0	1.0	16.9	
Reactor Charge-Discharge	33.0		2.5	3.6	30.5	3.0	3.0	3.0	21.5	
New Reactor Design	44.4	30.0	16.4	23.7	58.0	14.0	14.0	14.0	16.0	(250.0)
Other Projects	110.0	3.0	6.9	10.0	106.1	5.0	4.0	4.0	93.1	
Process Technology	18.4		3.4	4.9	15.0	4.0	6.0	5.0	-	(40.0)
Reactor Design Development	57.9		13.9	20.1	44.0	14.0	15.0	15.0	-	(256.5)
Separations Design Development	69.8		15.8	22.8	54.0	18.0	18.0	18.0	-	(160.5)
Metallurgy Design Development	23.7		5.7	8.2	18.0	6.0	6.0	6.0		(48.0)
Chemical Processing & Reduction Design Development	9.1		2.1	3.0	7.0	2.0	2.0	3.0		(15.0)
Weapons Design Development	8.5		1.5	2.2	7.0	2.0	2.0	3.0		(12.0)
Anticipated Future Projects						-	-	-		(304.4)
	401.8	33.0	69.3	100.0	365.5	71.0	72.0	79.0	149.5	(1,086.4)

DESIGN ENGINEERING SUB-SECTION:

Description	Authorized Backlog Mar. 1, 1956	Work Scheduled during Month	Time Spent During Month	% of Total Effort	Authorized Backlog Apr. 1, 1956	Schedule of Backlog FY 1956 Apr.	May	June	FY 1957	Anticipated Future Work FY 1957
Purex Modifications	49.0		.6	.8	48.4	3.4	4.0	4.0	37.0	
Reactor Plant Modifications	74.3		8.2	11.3	66.1	4.1	4.0	4.0	54.0	
CG-616	22.0		1.9	2.6	20.1	2.0	2.0	1.0	15.1	
CG-621	10.5		1.3	1.8	9.2	1.2	1.0	1.0	6.0	
CG-642	49.1		2.3	3.2	46.8	4.0	4.0	4.0	34.8	
CG-649	36.5		.1	.1	36.4	2.0	2.0	2.0	30.4	
CG-647	31.9		5.1	7.0	26.8	5.0	5.0	5.0	11.8	
CG-648	13.6		3.4	4.7	10.2	3.0	3.0	1.0	3.2	
CG-659	9.9		.7	1.0	9.2	3.0	2.0	1.0	3.2	
CG-663		16.0			16.0	5.0	5.0	3.0	3.0	
4-X Program	11.4		3.9	5.4	7.5	1.5	1.0	1.0	4.0	
Other Projects	69.3	2.0	15.0	20.7	56.3	11.3	11.0	10.0	24.0	
Process Technology	15.8		5.8	8.0	10.0	4.0	3.0	3.0	-	(48.0)
Design Development	40.4		7.4	10.2	33.0	10.0	10.0	13.0	-	(166.0)
Customer Work	66.3	19.0	16.8	23.2	68.5	12.5	10.0	10.0	36.0	
Anticipated Future Projects							(5.0)	(9.0)	-	(469.8)
	500.0	37.0	72.5	100.0	464.5	72.0	72.0	72.0	262.5	(683.8)

Present total authorized backlog for the five Design Engineering Units in terms of man months is distributed as follows:

	Authorized Work FY 1956 and Later
Architectural and Civil	66.5
Mechanical	190.0
Electrical	63.0
Instrument	116.0
Standards	29.0
	464.5

DECLASSIFIED

DEL

I. SUMMARY

A. Organization and Personnel

Following is a summary of personnel changes in Project Section during the month:

	February 29, 1956	March 31, 1956	Net Change
Employees on payroll	346	353	+7
Technical Graduates, Rotational	11	9	-2

The end-of-month status involved these changes:

	Project Section	Technical Graduates Rotational
Payroll additions	6	
Payroll removals	6	2
Transfers into Section	7	
Transfers from Section	0	
Transfers within Section	4	

At the end of the month there were positions open for 12 exempt and four nonexempt employees. The current strike of craftsmen employed by the labor service contractor has reduced the work normally performed in direct support of Minor Construction. As a result of the reduced workload, 76 Project Section employees were given notices of a temporary layoff to be effective March 30, 1956; however, 44 were placed in temporary assignments, seven went on vacation, and four married women declined assignments in deference to men who were heads of families.

B. Scope of Activities

At the end of the month, completion status of major construction was as follows:

Project No.		Completion Scheduled	Completion Actual
CA-512	100-K Area Facilities, Revisions #3, 4, 5	100%	100%[a]
CA-512	1706 KER Recirculation Facilities	89%	79%
CA-513-E	Purex Facilities, Part E	94%[b]	94%[b]
CA-546	Fuel Element Pilot Plant	99%	98%
CG-558	Reactor Plant Modifications, Phase I	49%[c]	53%[c]
CG-558	Reactor Plant Modifications, Phase II	7%	10%
CA-586	First Capacity Increase, 230 KV System	97%	89%
CG-598	Purex Acid Fractionator	48%	53%
CG-600	100-C Alterations	0%	0.8%
CA-613	Hanford 4X Program, Metal Conversion Plant	62%	55%
CG-621	Redox Contamination Control Facilities	39%	38%
CG-643	Redox Capacity Increase, Phase III	86%[d]	86%[d]

a Complete except for revisions and start-up items.
b For work now authorized, excluding the second remote crane on which no construction work was done.
c On basis of revised schedule.
d For work now authorized.

C. Craft Labor

A strike by teamsters, operating engineers, and cement finishers was begun on March 22, 1956, and the general issue was the discarding of the Hanford Works Agreement. All Minor Construction work was essentially stopped, and progress by other construction forces was reduced drastically. Further specific details are given in the following pages.

D. Safety and Security

The number of safety-security-health meetings increased to about 25 for Project Section components, including off-site vendor inspectors. Attendance by employees has continued to improve, and corrective actions are evident throughout offices and shops. A review of position descriptions was made to insure the inclusion of statements regarding individual responsibility for safety. In addition to its regular meetings, Minor Construction conducted four area mass meetings for service contractor personnel and two Special Hazards Orientations. All SWP work has progressed with excellent special hazards control.

E. Highlights

Project Service Sub-Section

The normal program for obtaining and assigning personnel was intensified with attempts to place the 76 nonexempt employees who were given layoff notices as a direct result of the current strike. The 1956 salary review also was given major attention. Estimating Unit completed 38 of the 76 scheduled estimates. The completed estimates were divided as follows: project proposal, eight; fair cost, three; budget, three; construction, fourteen; and study, ten. Field Surveys performed services in the various areas, including coal inventories, excavation surveys, bench marks, stack inclinations, and other routine services. Project Cost Control and Project Administration Units continued reviews of procedures, budgets, and project costs. Five property evaluations were completed, and studies were made of both time and financial losses being caused by the current strike. Reproduction output was a total of 302,634 square feet, and there were 1944 reproducibles processed for the Disaster File. Extensive work was done to improve safety conditions in the shops. Engineering Files distribution increased to about 89,000 prints, including about 600 classified items. The larger orders were 4802 prints for the Reactor Modification Program, and 4068 for 1706 KER Facilities.

Inspection Sub-Section

The inspection workload increased slightly during the month because of more orders and also because some orders were divided among vendors' plants. As of March 23, 1956, there were 506 orders for items requiring inspection, of which 474 had been assigned to inspectors. At the end of the month there were 514 orders, of which 483 have been assigned as follows: off-site inspectors, 380; on-site inspectors, 85; and government agencies, 18. These assigned orders represented $11,305,755. Inspection was completed on 89 orders, and requests for inspection were received on 116 new orders. The Corrosion Evaluation Program workload increased to the following totals: 207 Huey tests, 246 chemical determinations, 159 macro-micro tests, and 38 oxalic tests. On-site inspection activities also have increased, although future work depends largely on settlement of current labor problems.

UNCLASSIFIED

Primary inspection effort was concerned with Resistoflex connectors, nozzles, and process water pumps for the Reactor Expansion Program, and with calciners, spare concentrators, and the vacuum acid fractionator for Purex. The vendor for 1706 KER heat exchangers is still having extreme difficulties with production of tube bundles.

Minor Construction Sub-Section

The strike by teamsters, operating engineers, and cement finishers on March 22 has stopped Minor Construction work. Manpower of the labor service contractor was reduced by about 17 per cent to 745 on payroll, of which 67 craftsmen were on furlough, and 633 were absent because of the strike. The net effect of the strike cannot be evaluated, but currently only a very little shop work is being performed.

During the month Minor Construction assignments were completed on 22 work orders. The Sub-Section received work assignments on 24 work orders and CG-653, Redox Cooling Water Disposal. At the end of the month, total work authorized to Minor Construction amounted to $14,698,198 of which $7,280,292 has been expended or committed. As of March 28, the small tool inventory was 70 per cent complete in White Bluffs and 30 per cent complete in the areas. Steel storage bins and shelving are being procured for Warehouses #1, #2, and the Instrument Warehouse.

Project Engineering Sub-Section

Principal activities for the month included continuation of work (hampered by the labor strike) and material procurement. Work was completed on Part "A" of Purex Facilities, CA-513-A; Redox 241-SX Tank Farm, CA-539; Graphite Hot Shop, CA-555; Alteration to Redox Inert Gas Vent System, CG-626; Building 321, Fire Protection, IR-191; Steam Line to 275-EA Building, IR-201; and five engineering requests. At 100-K Area, work was continued on about 15 items under Revision #4, and Revision #5 was being circulated for final comments. The contractor for 1706 KER was given a 30-day extension because of delayed materials. Revised schedules have been approved for both phases of Reactor Plant Modifications. Fixed-price contract work was completed on the 100-DR Outfall and the replacement of filter media in 183-F Filter Plant. In 190-B Building, six of the eight pump units have been installed and tested. The 190-D Annex has been enclosed, and the equipment sole plates are being set.

Progress on the 230-KV System, CG-586, expansion was expedited toward cutover of the No. 1 line on April 11, 1956. At the Metal Conversion Plant, CG-613, equipment installations were continued in 224-UA Building. The #2 production calciner was received, and the #3 unit was scheduled for shipment by April 16, 1956.

The total business conducted by Project Engineering during February 1956 was $2,308,388, of which $520,194 was for Minor Construction labor and services.

F. 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.

DECLASSIFIED

DECLASSIFIED

Name	Title
J. S. Crowder, Project Engineer 200 Areas Project Engineering Unit 760 Building, 700 Area	A scribing tool having a retractable scratch awl.

Manager, Projects

II. STATISTICAL AND GENERAL

PROJECT INDEX

100 Area Projects

Project No.	Page
CA-512*	6
CA-512**	7
CA-548	8
CG-578	8
CG-579	8
CA-586	9
CG-616	10
CG-638	10
CG-642	10
CG-656	11
CG-663	11
CG-667	11
ER-1219	12
ER-1230	12
ER-1231	12
ER-1234	12
ER-1236	12
ER-1237	12
ER-E-492	13

200 Area Projects

Project No.	Page
CA-513-A	14
CA-513-E	14
CA-539	14
CG-598	15
CG-613	15
CG-621	18
CG-624	18
CA-625	19
CG-626	19
CG-635	20
CG-636	20
CG-643	20
CG-644	21
CG-647	21
CG-648	21
CG-653	22
CG-657	22
CA-662	22
CA-668	23
IR-201	23
IR-203	23
ER-2776	23
ER-2778	24
ER-2779	24
ER-2780	24
ER-2781	24
ER-2782	24
ER-2783	24

300 Area and General Projects

Project No.	Page
CA-546	25
CA-555	25
CA-590	26
CA-601	26
CG-614	26
CA-615	27
CG-618	27
CG-620	27
CG-630	28
CA-633	28
CA-639	28
CG-646	29
CG-649	29
CA-650	29
CG-658	29
CG-659	29
CG-660	30
IR-191	30
IR-200	30
IR-202	30
IR-204	31
Job 0050	31
Job 0068	31
ER-3122	31
ER-3125	31
ER-3132	32
ER-3133	32
ER-3134	32
ER-3137	32
ER-3139	32
ER-3141	33
ER-3143	33
ER-3144	33
ER-3145	33
ER-3146	33
ER-3147	33
ER-3148	34
ER-3149	34
ER-3150	34

Other 100 Area Projects

Project No.	Page
CG-558 Ph I	35
CG-558 Ph II	36
CG-600	37

* Excluding 1706 KER
** 1706 KER Recirculation Facilities

[redacted]

DECLASSIFIED

CA-512 - 1952 Reactor Expansion - 100-K Area Facilities

Total Authorized Funds: $162,000,000 - GE $28,210,000 - AEC $133,790,000
Total Estimated Cost: $162,000,000

Revision #3 and #4

	Weighted	Scheduled	Actual
Detailed Design Complete:	- - - Not Established - - -		
Field Progress Complete:			
F.P.	8.72%	27%	0%
M.C.	43.30%	84%	84%
P.F.	47.98%	49%	47%
Total		63%*	59%*

Average Manpower:
M.C. 18
P.F. 17

Approx. Accumulated Manpower: (man-days)
M.C. 4342
P.F. 3837

Directive Completion Date: November 1, 1956

* For Revisions #3 and #4, for which $2,410,000 has been authorized.

Although progress was impeded by labor problems and slow deliveries of material, work was continued on about fifteen items. Insulation of the Oil Storage Building was completed March 20, 1956. Replacement of test hole tubes was completed in 105-KE, leaving two to be removed and four to be replaced in 105-KW. Two Cuno filter cartridges for the solids feed purge system were returned to the vendor. Accumulator tanks for the poison column systems have been placed in both 105-K Buildings as a final preparation for the partitions that are to be delivered in late April 1956. The status of filter plant backwash valve repair remained at 16 completed, and six yet to be repaired.

The contract for modifications to the heating and ventilating systems in 1704-K and 1720-K Buildings was awarded to the Lewis Hopkins Company. The Notice to Proceed is being prepared for issue in early April 1956.

Material delivery dates indicate that work can begin about April 2, 1956, on the Flame Failure Detection and Ignition System for 165-K Steam Generators. Material is being procured for a test program on the Building Vacuum System. For the Pressure Monitoring System, 75 Panellit gages have been modified by the addition of a prototype mercury switch bottle. These gages are to be installed in 105-KE at the next shutdown, and additional gages will be modified and installed for testing when new magnets become available. Completion of the cross-under drain instrumentation was delayed by lack of magnetral flow switches. The beta monitoring assembly for 107-K Building is being fabricated in the 300 Area Instrument Shop, and completion is dependent upon material delivery. The "A" tank in 107-KW has been raised and shimmed, and the grant holes have been drilled.

Design was completed for Drainage Sewer Modifications and Dowtherm System Installation in 1706-KE, and contract services are being requested of the Commission. A new design has been received for improvements to the Heat Exchanger Pit Equipment, and work is to begin

CA-512 - 1952 Reactor Expansion - 100-K Area Facilities - (Continued)

Revisions #3 and #4 - (Continued)

when all material has been procured. About 80% of the material for the Gamma Water Monitoring System has been requisitioned, and Design Section has been requested to complete the requisitioning so that work can begin by June 1, 1956.

For the Area Drainage Sewer System Contamination Back-Up, two holes have been cut in the top of 1904-K Building and covers placed over them. Circular weirs are to be placed in this building when the teamsters return to work.

1706-KER Recirculation Loop

	Weighted	Scheduled	Actual
Detailed Design Complete:			100%
Field Progress Complete:			
F.P.	60%	100%	81%
M.C.	40%	73%	76%
Total		89%	79%

Average Manpower:
F.P. 36
M.C. 6

Approx. Accumulated Manpower: (man-days)
F.P. 3116
M.C. 2676

Directive Completion Date: September 1, 1956

Fixed-Price Contractor

The L. H. Hoffman Company has been given a 30 day extension because of material delays. Items not yet available are two recirculation pumps, four heat exchangers, and miscellaneous items of instrumentation.

Installation work on all components was continued with preparatory work being completed for loop #1 and make-up room acceptance testing.

Minor Construction

Wiring of the instrument panels was continued. Calibration of instruments has been started.

Piping in the north tunnel is being insulated.

1706-KER Tie-in (CC-8155)

Fabrication of the front face piping was continued. The 105 instrument panel was installed and is being wired. Wiring from 1706-KE is being pulled to the 105 Building.

Completion of pipe work in the Ball 3-X room is still awaiting delivery of Hammel-Dahl control valves.

DECLASSIFIED

DECLASSIFIED

[redacted]

DEL

CA-548 - New VSR Test Tower

Project Preparation Complete: 100% Scoping Complete: 100% Prelim. Design Complete: 100%

Directive Completion Date: March 1, 1957
Total Authorized Funds: $125,000 - GE $16,500 - AEC $108,500
Total Estimated Cost: $125,000

Comments on preliminary design, and authorization to proceed with detailed design were transmitted to the architect-engineer by an AEC letter dated March 16, 1956. The architect-engineer was requested to prepare a detailed estimate of costs for the facility so that the several portions of the work could be evaluated with due regard for cost and usefulness. The General Electric Fire and Safety Unit has requested that a fire sprinkler system be installed. This item is a scope change, and costs are being investigated with the other detailed cost estimate.

CG-578 - Effluent Water Monitoring Improvements - 100-B, D, DR, F & H Areas

	Weighted	Scheduled	Actual
Field Progress Complete:			
P.F.	100%		
Total		89%	97%

Average Manpower:
P.F. 3

Approx. Accumulated Manpower: (man-days)
P.F. 4,550

Directive Completion Date: July 1, 1956
Total Authorized Funds: $532,000
Total Estimated Cost: $532,000

New regulating valves have been installed in the 105-B Gamma System. A definite improvement in flow regulation has been noted; however, detailed field checks will be made to ascertain that the system can give dependable operation through a four to eight-hour period.

Pile Technology and Design Sections are now studying the gain changes being experienced in the scintillation probe during start-up periods and will recommend corrective action by approximately April 1, 1956.

CG-579 - Effluent Water Monitoring Improvements - 100-C

	Weighted	Scheduled	Actual
Field Progress Complete:			
P.F.	100%		1%

Average Manpower:
P.F. 4

Approx. Accumulated Manpower: (man-days)
P.F. 40

[redacted]

CG-579 - Effluent Water Monitoring Improvements - 100-C - (Continued)

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.

Plant forces started work on this project on March 21, 1956. Instrument personnel have started testing spectrometer assemblies. Mechanical crafts have started to assemble fittings for fabrication of turret and rotameter piping.

CA-586 - First Capacity Increase - 230 KV System

		Weighted	Scheduled	Actual
Field Progress Complete:				
	BPA	44.4%	100%	90%
	F.P.	52.0%	100%	90%
	M.C.	2.0%	67%	67%
	P.F.	1.6%	10%	10%
	Total	100.0%	97%	89%

Average Manpower:

F.P.	15
M.C.	1
P.F.	0

Approx. Accumulated Manpower: (man-days)

F.P.	1675
M.C.	260
P.F.	30

Directive Completion Date: August 1, 1956
Total Authorized Funds: $1,100,000 - GE $119,500 - AEC $980,500
Total Estimated Cost: $1,100,000

W. L. Ridge Construction Co.

Backfilling was proceeding around tower footings along the line. Placement of the concrete for the switching station and line disconnect structures is about 98% complete. The contractor is attempting to procure concrete from an off-site source in order to complete footings, and is also placing concrete by hand at the #2 disconnect structure.

Casey Electric Co.

Erection of the switching station is about 50% complete, and subassembly of the line disconnect structures is about 60% complete. An outage was scheduled for March 28, 1956, to allow completion of steel erection in 100-K. An installation engineer is scheduled to report to the jobsite on March 29, 1956, to supervise the assembly of the oil circuit breaker. On March 23, 1956, the oil circuit breaker was placed in the permanent location.

DECLASSIFIED

DECLASSIFIED

[redacted]

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

	Scheduled	Actual
Field Progress Complete:		
M.C.		1%
Total		1%

Average Manpower:
M.C. 3

Approx. Accumulated Manpower: (man-days)
M.C. 25

Directive Completion Date: October 1, 1956
Total Authorized Funds: $400,000 (Interim Authorization)
Total Estimated Cost: $470,000

Scoping, preliminary and detailed design are the responsibility of the Design Section.

Minor Construction forces started work on this project on March 9, 1956, with the reconditioning of one acid storage tank and one LaBour acid pump from 100-F Area. These were utilized by the Manufacturing Department to provide temporary acid feed facilities in 100-H Area. A work release was issued to Minor Construction for overhauling acid feed pumps and performing tie-ins.

A letter has been sent to the Commission requesting that Minor Construction forces be permitted to install one existing acid storage tank in 100-D Area, and one in 100-F Area, to permit direct off-site procurement of sulfuric acid for those areas at an early date. The justification for this request is the cost savings and greater safety to be realized.

CG-638 - Alum Activated Silica Water Treatment Facility - Phase II

Total Authorized Funds: $275,000
Total Estimated Cost: $275,000

Scoping, preliminary and detailed design are the responsibility of the Design Section.

Work on this project is being suspended until the in-pile test of "Separan" has been completed.

CG-642 - Continuous Charge-Discharge Facility - 105-C

	Scheduled	Actual
Detailed Design Complete:	10%	13%

Total Authorized Funds: $200,000 (Interim Authorization)
Total Estimated Cost: Not Established

[redacted]

-642 - Continuous Charge-Discharge Facility - 105-C - (Continued)

Detailed design, including procurement of equipment components for testing purposes, is the responsibility of the Design Section.

The Project Representatives held a meeting on March 9, 1956, to discuss design criteria. Since that time individual meetings have been held between Design and Manufacturing, Design and Project, and Design and Technical to resolve the comments within minimum time limits.

CG-656 - Installation of Raw Water Cross-Tie - 105-C (ER-1229)

Project Preparation Complete: 100% Scoping Complete: 100% Prelim. Design Complete: 100%

	Actual
Detailed Design Complete:	25%

Total Estimated Cost: $25,000

The second and third work planning meetings have been held. Agreement has been attained regarding methods of accomplishing the work. Reactor section has requested a scope change; it is determined that a 12-inch isolation valve will be required in the new cross-tie line. Material requisitions are being prepared.

CG-663 - Steam Auxiliaries for the 165-K Steam Generators

Project Preparation Complete: 100%

Total Estimated Cost: $555,000

The project proposal has been approved by the Commission; the directive has been received dated March 23, 1956.

CG-667 - Improved Space Utilization - 105-E, D and F Buildings (ER-1227)

Project Preparation Complete: 100% Scoping Complete: 100%

Total Authorized Funds: $ 1,900
Total Estimated Cost: $212,000

The project proposal has been approved by Financial Department and submitted to the General Manager for approval.

DECLASSIFIED

ER-1219 - 105-KW Laboratory

Project Preparation Complete: 100% Scoping Complete: 100%

Total Estimated Cost: $45,000

The project proposal is being routed for approval signatures within General Electric Company.

ER-1230 - Metal Examination Facilities; Metal Cutting Machine & Metal Etching Appratus

Project Preparation Complete: 80%

A decision was made to submit the project proposal for design only, and the proposal is being routed for approvals. Design cost and time estimates are being prepared, and the scope document including detailed criteria has been requested from the sponsor.

ER-1231 - Installation of Soundproofing Facilities in 1706-KE Building

Total Authorized Funds: $600

This work was included within the items of Revision #5 to Project Proposal CA-512.

ER-1234 - Water Plant Component Test Loop - 1706-KE

Project Preparation Complete: 100% Scoping Complete: 100% Prelim. Design Complete: 100%

Total Authorized Funds: $300

The project proposal is being routed for approval signatures within General Electric Company.

ER-1236 - Feasibility Study of Recirculating Gas Loop

Total Authorized Funds: $10,000

The study, Document No. GEH-22786, was completed and issued as of March 16, 1956, and the estimated total cost was $800,000. A closing notice was issued.

ER-1237 - Modifications to KAPL 120 Test Facility

Total Authorized Funds: $170

This engineering request was established to cover cost of preparing cost and time estimates for the preparation of a Feasibility Study. This work has been completed.

ER-E-492 - Aerial Line Relocation 107-B, C, D, DR, and F

Total Authorized Funds: $1,500

The rough draft outline of the project proposal has been prepared.

DECLASSIFIED

DECLASSIFIED

DEL

CA-513-A - Purex Facility - Expansion of 200 Area Facilities

Total Authorized Funds: $ 77,653,984 - GE $5,947,500 - AEC $71,706,484
Total Estimated Cost: $ 77,653,984

The following items remain to be accomplished:

a. Fabrication (by vendor) and mock-up on site of two spare concentrators.
b. Paving of miscellaneous roads and walks in vicinity of 202-A Building.
c. Installation of miscellaneous valves and controls for the Failed Equipment Disposal Tunnel.

CA-513-E - Purex Facility - Expansion of 200 Area Facilities

	Weighted	Scheduled	Actual
Detailed Design Complete:		100%	100 %
Field Progress Complete:			
F.P.	27%	100%	100 %
M.C.	73%	95%	91.4%
Total		94% *	94 % *

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

Final inspection on the 241-A Tank Farm Circulation Facilities, Hoffman Construction Company, Contract AT(45-1)-1104, was made on March 16, 1956. Exceptions were: replacement of asphalt paving-(completed on March 21) and delivery of instruments for panel board in Control House. Instruments are expected in April, 1956.

Iodine Monitors (Caustic System) were completed March 21 except for run-in which was interrupted by labor strike. Continuous Samplers are approximately 35% done.

* The indicated total percentages, scheduled and actual, do not include the second remote crane which was recently authorized by the Commission.

CA-539 - Additional Waste Storage Facilities for Redox, 241-SX

		Weighted	Scheduled	Actual
Detailed Design Complete:			100%	100%
Field Progress Complete:				
F.P.	(New Work)	69%	100%	100%
M.C.		31%	100%	100%
Total			100%	100%

Average Manpower:

M.C. 5

Approx. Accumulated Manpower: (man-days)

F.P.	2,100
M.C.	3,400
P.F.	60

Directive Completion Date: April 1, 1956
Total Authorized Funds: $ 3,897,000 - GE $819,500 - AEC $3,077,500

[redacted]

CA-539 - Additional Waste Storage Facilities for Redox, 241-SX (Continued)

Fixed-price contract work by Hoffman Construction Company, was completed on March 16, 1956.

The project was closed-out on March 30, 1956, with exceptions to be completed by Minor Construction on work order as follows:

1. Installation of instrument panel and transducers.
2. Installation of six (6) liquid level reels.
3. Fence and temporary construction removal.
4. Clean-up of miscellaneous punch-list items.

Information pertinent to the issuance of a Physical Completion Notice is being assembled.

CG-598 - Purex Acid Fractionator

	Weighted	Scheduled	Actual
Detailed Design Complete:		100%	100%
Field Progress Complete:			
F.P.	6.6%	100%	100%
M.C.	93.4%	45%	50% *
Total		48%	53% *

Average Manpower:
M.C. 35

Approx. Accumulated Manpower: (man-days)
M.C. 2,870

Directive Completion Date: September 1, 1956
Total Authorized Funds: $ 920,000
Total Estimated Cost: $ 920,000

Vessel TK-U8, from Lummus Company, expected on site approximately April 10, 1956. Vessel TK-U5 has slipped 2 - 3 weeks from that date.

* These figures are as of March 22, 1956 when craftsmen did not appear for work because of the present labor difficulties.

CG-613 - Hanford 4X Program - Metal Conversion Plant

	Weighted	Scheduled	Actual
Field Progress Complete:			
F.P.	28.5%	90%	92%
M.C.	70.2%	50%	40%
P.F.	1.3%	70%	75%
Total		62% *	55%

Average Manpower:
F.P. 50
M.C. 30
P.F. 0

DECLASSIFIED

Approx. Accumulated Manpower: (man-days)
F.P. 3,800
M.C. 5,400
P.F. 394

* A revised schedule will be prepared at the end of the current work stoppage.

DECLASSIFIED

CG-613 - Hanford 4X Program - Metal Conversion Plant (Continued)

Directive Completion Date: December 31, 1956
Total Authorized Funds: $ 4,000,000
Total Estimated Cost: $ 4,320,000

Scoping, preliminary and detailed design are the responsibility of the Design Section.

Procurement - General

Procurement of engineered items and critical materials is virtually complete except for 8" pipe, an evactor and a screw conveyor. Coupons were clipped on one-half of the 8" pipe March 21 and one-half on March 26, 1956. The material will be shipped on the basis of third period corrosion test results, if they are favorable.

Two of the castings for the evactor have repeatedly failed corrosion. The vendor is now re-heat treating a set of castings in the hope of obtaining more favorable corrosion test results.

Welding requirements on the screw conveyor have been changed to permit the use of the metal arc process. This will shorten the fabrication time and will result in a better product.

Phase III (Installation of Process Equipment, Building 224-UA) - L. H. Hoffman

The outside electrical work on the switching structure and pole line is complete.
Painting on the exterior of the building is nearing completion.
Work on the product handling system is well along.
The process bag filters have been installed.
Fairly extensive repair work will be required on the internals of one of the filters due to the fact that poor shoring caused damage in shipping.
The ventilation bag filters have been installed.
The 14" and 12" piping to the filters is being fabricated in Portland, Oregon.
Instrumentation for the air conditioning equipment is continuing.
Most electrical work is complete except for the installation of power wiring and conduit in the electrical gallery.

Phase IV Contract (Railroad Car Loading Facility, Roads) - L.H. Hoffman

All concrete work is complete except a small block-out for a wheel guard. This work comprises 60% of the contract.

Permission has been given to perform all the road work at the same time provided it does not conflict with other work being performed by this same contractor on the 224-UA Building (Phase III).

Phase V (Maintenance Facility)

Design is being performed by an A-E by contract with the Commission under the direction of the Design Section. Design is scheduled for completion early in May. Construction is scheduled to start in June, 1956.

[redacted]

613 - Hanford 4X Program - Metal Conversion Plant (Continued)

Phase VI (Railroad Car Modifications)

The Commission has made arrangements with three railroads to modify the cars required. A request has been sent to the Commission to increase the number of cars to nineteen to meet the scope requirements.

Minor Construction Work

General: A strike by several of the construction crafts called on March 22, 1956, has stopped all Minor Construction work. The completion of construction work will probably be delayed by an amount equal to the duration of the strike.

224-U Phase: Piping work on the absorber tower and gas cooler, etc., in "A" Cell was in progress. The tie-in work in B & D Cells is going slower than expected because one hour time limits (typical) result whenever an existing line is disconnected or cut.

The UNH feed line from TK-X-30 to the roof of the 224-UA Building is complete except for insulation.

Some form work was started on the shielding wall before the strike started. Work on the 224-U unloading modifications will start about three weeks in advance of the time the screw conveyor is to be shipped. Shipment appears to be in late April or early May. About three weeks will be required to complete this work after receipt of the conveyor.

224-UA Phase: Component parts of the #1 calciner unit have been temporarily placed in the "G" Cell, waiting for final placement after welding of thermocouple studs to the trough.

Process piping was being installed in "G", "H" and "J" Cells.

Calciners

The #2 production unit has been tested and shipped. The #3 unit is being set up for test and is scheduled for shipment by April 6, 1956. Ingots for the two remaining shafts (6th unit and spare) were to be shipped for forging on March 24, 1956 and ready for coupon clipping the week of April 9, 1956. Feed nozzle castings are awaiting corrosion results.

General Project Status

A revised project proposal is being prepared requesting $320,000 of additional funds. The beneficial use date of June 1, 1956 is not changed, however, it will be defined as the date when three (3) calciners are ready for performance testing. The current strike situation, however, will affect the beneficial use date. It can be expected that the beneficial use date will be extended beyond June 1, 1956 by an amount equal to the length of the strike, unless double or triple shifting and overtime measures are used to overcome the delay encountered.

The project proposal submission will be held up until the strike is settled.

DECLASSIFIED

DECLASSIFIED

CG-621 - Redox Contamination Control Facilities

	Weighted	Scheduled	Actual
Field Progress Complete:			
M.C.	20.8%	35%	34%
P.F.	79.2%	40%	39%
Total		39%	38%

Average Manpower:
M.C. 15
P.F. 2

Approx. Accumulated Manpower: (man-days)
M.C. 1,092
P.F. 996

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.

In-Cell Ozonization, Phase I

Work on the air compressor installation is continuing. Bids on the spare ozone-contactor will be opened April 20, 1956.

Modification to J-6 Vent System

Fabrication of the J-6 precondenser dunnage started March 23, 1956. Condenser arrival date is still April 27, 1956. Cold side instrumentation is in progress.

Contaminated Equipment Replacement

The H-5 tower will be shipped approximately September 1, 1956. The order for the H-4 tank and tube bundle is being placed. Delivery is nine months (270 days) from placement of the order.

Canyon Washdown Facilities

The nozzle piping and headers have been fabricated. Approximately one-half of the roof penetrations have been made. Electrical conduit installation is in progress. The The affects on the project of the work stoppage of March 22, 1956 cannot be assessed at this time.

CG-624 - Redox Railroad Tunnel Ventilation Barrier

	Weighted	Scheduled	Actual
Field Progress Complete:			
M.C.	100%	*	8%

* A project proposal revision letter has been submitted, requesting an extension of time. A revised schedule will be submitted based on the new Directive date.

[redacted]

CG-624 - Redox Railroad Tunnel Ventilation Barrier (Continued)

Average Manpower: M.C. 1

Approx. Accumulated Manpower: (man-days) M.C. 20**

Directive Completion Date: April 30, 1956
Total Authorized Funds: $ 57,000
Total Estimated Cost: $ 57,000

** Corrected to show actual man-days expenditure.

Scoping, preliminary and detailed design are the responsibility of the Design Section.

Mock-up test of doors has not yet been accomplished, as of this writing. It is presently indicated that this will be done by the end of the month, with shipment directly thereafter.

Installation of rail collection bars was in progress, based on modified design, but is now held up by the Minor Construction work stoppage.

CA-625 - Additional Waste Disposal Facilities - 200 Area

Total Authorized Funds: $ 115,000 - GE $115,000 - AEC $0
Total Estimated Cost: $ 5,500,000

Preliminary and detailed design, including field surveys, are the responsibility of the Design Section.

CG-626 - Alteration to Redox Inert Gas Vent System

	Weighted	Scheduled	Actual
Field Progress Complete:			
P.F.	100%		
Total		100%	100%

Average Manpower: P.F. 2

Approx. Accumulated Manpower: (man-days) P.F. 412

Directive Completion Date: April 1, 1956
Total Authorized Funds: $ 115,000

Scoping, preliminary and detailed design are the responsibility of the Design Section.

The work is complete and the project will be closed out as of March 31, 1956, with work order commitments for start-up work and a few minor items.

DECLASSIFIED

DECLASSIFIED

CG-635 - Redox Stack Particulate Sampler

Project Preparation Complete: 100% Scoping Complete: 100% Prelim. Design Complete: 100%

	Actual
Detailed Design Complete:	100%

Directive Completion Date: August 1, 1956
Total Authorized Funds: $ 40,000
Total Estimated Cost: $ 42,000 *

* The revised project proposal estimate based on final design indicated a total project cost of $42,000; however, General Electric Company management has determined that construction will be initiated with the funds originally authorized.

Detailed design is the responsibility of the Design Section.

CG-636 - SWP Service Facilities - Redox

Total Authorized Funds: $ 100 (Project Section)
Total Estimated Cost: $ 157,000

Project proposal preparation is the responsibility of the Design Section.

The project proposal is being routed for approval signatures within the General Electric Company. Funds for the subject facilities will come from the FY-1957 Budget.

CG-643 - Redox Capacity Increase - Phase III

	Weighted	Scheduled	Actual
Field Progress Complete:			
M.C.	25%	75%	75%
P.F.	75%	90%	90%
Total		86%	86%

Average Manpower:
M.C. 0
P.F. 1

Approx. Accumulated Manpower: (man-days)
M.C. 188
P.F. 172

Directive Completion Date: October 1, 1956
Total Authorized Funds: $ 211,500
Total Estimated Cost: Not Established (Approx. $1,000,000)**

** Steps are being taken to obtain additional funds and authorization from the Commission for advanced procurement of critical materials which will be required for additional work on this project.

[redacted]

CG-643 - Redox Capacity Increase - Phase III

Detailed design is the responsibility of the Design Section.

The work of modifying the second 2-E column was turned over to Minor Construction on February 9, 1956. Inquiries to vendors to do the work were returned with "No Bid" quotations. The addition of this work altered the amount of work to be performed by Minor Construction. The official construction schedule was revised to reflect this change and submitted to the Commission for approval. Progress on modification of the column has been delayed pending availability of material.

Storage of the spare D-11 vessel and cold side work remain for Plant Forces to complete; also mock-up of second 2-E Column. Some work was performed by Plant Forces on modifying the spare F-3 Condenser for use as a spare F-6 Condenser.

CG-644 - Silica Gel Tail End Treatment

Total Authorized Funds: $ 60,000 (Interim Authorization for Design)
Total Estimated Cost: $ 453,000

Preparation of the project proposal and management of the Architect-Engineer's detail design are the responsibility of the Design Section.

Detailed design is being performed by Nickum and Sons of Seattle under contract AT(45-1)-1111, Mod. #1, dated March 1, 1956. Design Criteria was transmitted to the AE. on March 13, 1956. Design is scheduled to be complete July 1, 1956. Approximately 50 drawings, a specification, and Acceptance Test Procedures are involved.

CG-647 - Back-Up Radio-Iodine Removal Facilities, Purex

Total Authorized Funds: $ 60,000 (Interim Authorization for Design)
Total Estimated Cost: $ 1,150,000

Detailed design is the responsibility of the Design Section.

Revision #1 of the project proposal, requesting construction funds, was transmitted to the Commission on February 7, 1956, and forwarded to AEC-Washington for approval as of February 27, 1956.

CG-648 - Auxiliary Radio-Iodine Removal & Nitric Acid Recovery - Redox

Total Authorized Funds: $ 60,000 (Interim Authorization)
Total Estimated Cost: $ 870,000

Preliminary and detailed design are being managed by the Design Section.

Revision #1 of the project proposal was transmitted to the Commission on January 19, 1956 and forwarded to AEC-Washington for approval as of February 3, 1956.

DECLASSIFIED

DECLASSIFIED

CG-653 - Redox Cooling Water Disposal

	Weighted	Scheduled	Actual
Field Progress Complete:			
F.P.	37%	0%	0%
M.C.	45%	0%	.5% *
P.F.	18%	10%	10%
Total		2%	2%

Approx. Accumulated Manpower: (man-days)
P.F. 7

Directive Completion Date: September 30, 1956
Total Authorized Funds: $ 225,000
Total Estimated Cost: $ 225,000

* Minor Construction has completed exploratory excavations in the vicinity of Crib 216-S-6 and found no contamination or underground water. Since boundaries of contractor work and Minor Construction work have been firmly established, the contract will be let on a fixed-price basis rather than the unit price as originally planned.

Scoping and detailed design are the responsibility of the Design Section.

The fixed-price bid package was transmitted from the General Electric Company to the Commission on March 21, 1956. The bid assemblies were mailed out to prospective bidders on or about March 30, 1956, with bids due three (3) weeks later.

CG-657 - Improvements to Redox Plant Ventilation

Total Authorized Funds: $ 150 (Project Section)
Total Estimated Cost: $ 205,000

Project proposal preparation and detailed design are the responsibility of the Design Section.

The project proposal was transmitted to the Commission on January 19, 1956 and forwarded to AEC-Washington for approval as of February 3, 1956.

CA-662 - 2101-M Building Conversion (ER-2764)

Total Authorized Funds: $ 2,000
Total Estimated Cost: $ 123,500

A scope change, including both an increase in the fire protection sprinkler coverage and a reduction in the number of air conditioner units that will be insulated and placed on a thirty (30) day standby basis for the 2101-M Building, has been introduced by the Manufacturing Department. The project proposal is being revised to include the new scope.

-668 - Installation of Sprinkler System, 275-EA Building

Project Preparation Complete: 100% Scoping Complete: 100% Prelim. Design Complete: 100%

Total Authorized Funds: $ 2,000
Total Estimated Cost: $ 26,000

The project proposal was transmitted to the Commission on March 16, 1956 and is awaiting authorization. The proposal calls for the design and construction of the facilities to be managed by the Commission, with the exception of actual replacement of the temporary fire alarm loop to the building, which is to be done by Plant Forces. The General Electric Company will provide minimum design criteria and perform Title III services on the work to be performed by Plant Forces.

IR-201 - Steam Line to the 275-EA Building

	Actual
Field Progress Complete:	
Total	100%

Approx. Accumulated Manpower: (man-days)
M.C. 160

Directive Completion Date: April 15, 1956
Total Authorized Funds: $ 19,200

The steam line was completed and tested by Minor Construction and accepted by the Manufacturing Department on March 16, 1956. Information pertinent to the issuance of a Physical Completion Notice is being assembled.

IR-203 - Coating Waste Transfer Line, 241-S to 241-U

Project Preparation Complete: 100% Scoping Complete: 100% Prelim. Design Complete: 100%

Directive Completion Date: November 30, 1956
Total Authorized Funds: $ 17,800
Total Estimated Cost: $ 17,800

The informal request was approved by the Commission on March 16, 1956. A design order was issued to the Design Section for the preparation of detailed design. It is anticipated that field work by Minor Construction will start during April, 1956.

ER-2776 - Relocation of Purex Cooling Water Swamp

Total Estimated Cost: $ 330,000

Preparation of the project proposal is the responsibility of the Design Section.

The project proposal is being circulated for approval signatures within the General Electric Company.

[redacted]

DECLASSIFIED

ER-2778 - In-Line Monitoring Instruments - Redox & Purex

Preparation of the project proposal is the responsibility of the Design Section.

ER-2779 - Change House Facilities, 275-W Building

Project Preparation Complete: 100% Scoping Complete: 100% Prelim. Design Complete: 100%

Total Authorized Funds: $ 2,000
Total Estimated Cost: $ 33,500

The project proposal is being routed for approval signatures within the General Electric Company.

ER-2780 - Improved Conveyor System for the RMA Fabrication Line

Total Authorized Funds: $ 150 (Project Section)
Total Estimated Cost: $ 133,000

Project proposal preparation, preliminary and detailed design, including field surveys, are the responsibility of the Design Section.

The project proposal is being routed for approval signatures within the General Electric Company.

ER-2781 - Shelters on Regulated Docks - Purex

Informal Request Complete: 35% Scoping Complete: 100% Prelim. Design Complete: 100%

An informal request is being prepared by the Project Section - 200 Areas - Project Engineering Unit.

ER-2782 - Gantry Crane Facilities, 241-A Tank Farm

Informal Request Complete: 100% Scoping Complete: 100% Prelim. Design Complete: 100%

Total Authorized Funds: $ 1,500
Total Estimated Cost: $ 17,600

The informal request is being routed for approval signatures within the General Electric Company.

ER-2783 - Modifications to Redox 233-S Concentration Building

Total Authorized Funds: $ 150

A request has been received from the Design Section to furnish information pertinent to preparation of a project proposal for the subject work.

In general it is planned to provide an auxiliary exhaust system, an additional PR can storage room and three (3) maintenance platforms with stairs to facilitate work in the process area.

[redacted]

CA-546 - Fuel Element Pilot Plant

	Weighted	Scheduled	Actual
Detailed Design Complete:		100%	100%
Field Progress Complete:			
F.P.	53.6%	99%	99%
M.C.	45.7%	98%	95%
P.F.	.7%	95%	95%
Total		99%	98%

Average Manpower:

F.P.	7
M.C.	20

Approx. Accumulated Manpower: (man-days)

F.P.	450
M.C.	4,420
P.F.	175

Directive Completion Date: May 1, 1956
Total Authorized Funds: $ 1,600,000 - GE $780,000 - AEC $820,000
Total Estimated Cost: $ 1,600,000

Because of difficulty in obtaining materials, the vendor-fabricator of rack frames for the anodyzing facility is experiencing delays in completing the order. The rack frames are now scheduled for shipment from the Seattle area on April 2, 1956.

Minor Construction has completed work on the plating line except for the installation of one tank not yet released from the 3706 Building. Work is progressing on the anodyzing facility, wherein all equipment requiring piping and electrical services has been installed. Pending return of crafts, items pertaining to testing, minor corrections, and clean-up of completed work are being delayed.

F. H. Lohse, contractor for the additional offices, has completed installation of Hauserman partitions. Piping and electrical services are being installed to the heating and ventilation unit. The sponsor has obtained office furniture and will occupy the offices immediately after completion of work by the contractor.

CA-555 - Graphite Hot Shop & Storage Facility - 3730 Building

	Weighted	Scheduled	Actual
Detailed Design Complete:			100%
Field Progress Complete:			
F.P.	70%	100%	100%
M.C.	30%	100%	100%

Directive Completion Date: April 1, 1956
Total Authorized Funds: $ 83,500 - GE $36,000 - AEC $47,500
Total Estimated Cost: $ 83,500

This project was complete and the Stop Charge Notice was issued on March 16, 1956. Preparation of as-built drawings and unitization will be done by accruals.

DECLASSIFIED

DECLASSIFIED

CA-590 - Fly Ash Collection Equipment - Building 384

Project Preparation Complete: 100% Scoping Complete: 100% Prelim. Design Complete: 100%

Directive Completion Date: October 30, 1956
Total Authorized Funds: $ 40,000 - GE $6,000 - AEC $34,000
Total Estimated Cost: $ 40,000

The Notice of Award was issued to the low bidder, Frank Lohse, March 20, 1956. The Notice to Proceed is anticipated about April 2, 1956.

CA-601 - General Grounds Improvements - 300 Area

Project Preparation Complete: 100% Scoping Complete: 100% Prelim. Design Complete: 100%

	Scheduled	Actual
Detailed Design Complete:	*	65%

Directive Completion Date: December 1, 1956
Total Authorized Funds: $ 60,000 - GE $5,000 - AEC $55,000
Total Estimated Cost: $ 60,000

* The design schedule submitted by the architect-engineer has not been approved by the Commission. Preparation of the bid assembly for the lump sum work is dependent upon the completion of design by the architect-engineer.

CG-614 - Hanford 4X Program - 300 Area

	Weighted	Scheduled	Actual
Field Progress Complete:			
F.P.	16.1%	0 %	0 %
M.C.	2.1%	50 %	100 %
P.F.	81.8%	94.4%	96 %
Total		81.3%	81.7%

Average Manpower: P.F. 2

Approx. Accumulated Manpower: (man-days) P.F. 808

Directive Completion Date: July 1, 1956
Total Authorized Funds: $ 340,000
Total Estimated Cost: $ 340,000

Scoping, preliminary and detailed design are the responsibility of the Design Section.

Bids were opened for the 3707-D Change House Modifications on March 15, 1956. G. A. Grant of Pasco was the low bidder at $16,445; fair cost $18,200. The Notice of Award was issued on March 20, 1956. Minor Construction has completed the temporary equipment re-arrangements prior to start of work by the contractor.

DECLASSIFIED

[redacted]

[redacted]A-615 - Mechanical Maintenance Shop Centralization - 100 Areas

Project Preparation Complete: 100% Scoping Complete: 100% Prelim. Design Complete: 100%

	Weighted	Scheduled	Actual
Detailed Design Complete:		30%	65%
Field Progress Complete:			
F.P.	65%	0%	0%
M.C.	2%	0%	0%
P.F.	33%	5%	23%
Total		3%	12%

Average Manpower: P.F. 2

Approx. Accumulated Manpower: (man-days) P.F. 62

Directive Completion Date: February 28, 1957
Total Authorized Funds: $ 92,000 - GE $42,000 - AEC $50,000
Total Estimated Cost: $ 92,000

Six prints have been received for comments and returned to the Design Section. The balance of the prints on the lump sum portion of the work were received for comment on March 27, 1956. The specifications are expected for comment by March 29, 1956. Work is progressing on removal and installation of machine shop equipment. All material to be procured by Project Engineering will be requisitioned by April 1, 1956.

[redacted]

CG-618 - Replacement of Steam Line Support Poles

	Weighted	Scheduled	Actual
Field Progress Complete:			
M.C.	100%	100%	31% *

Directive Completion Date: January 15, 1956 *
Total Authorized Funds: $ 95,000
Total Estimated Cost: $ 110,000

* The project proposal revision requesting total funds of $110,000 and an extension of time to August 1, 1956 is being routed for approval signatures. This revision was transmitted to the Commission on March 23, 1956.

Construction, which was scheduled to resume on March 26, 1956, has been delayed still further by the current labor strikes.

CG-620 - Melt Plant Modifications - 314 Building

Project Preparation Complete: 100%

Directive Completion Date: January 15, 1956 *
[redacted]tal Authorized Funds: $ 24,000
Total Estimated Cost: $ 143,000

* The revised project proposal was transmitted to the Atomic Energy Commission on March 6, 1956 and is awaiting their approval.

[redacted]

CG-630 - Alterations to Minor Construction Fabrication Shops

Project Preparation Complete: 100% Scoping Complete: 100% Prelim. Design Complete: 100%

	Weighted	Scheduled	Actual
Detailed Design Complete:		100%	100%
Field Progress Complete:			
F.P.	15%	0%	0%
M.C.	85%	33%	59% *
Total		28%	50% *

Average Manpower:
M.C. 2

Approx. Accumulated Manpower: (man-days)
M.C. 582

Directive Completion Date: October 15, 1956
Total Authorized Funds: $ 93,000
Total Estimated Cost: $ 93,000

* Percentages of completion have been re-evaluated, based on a cost to complete estimate which indicates that sufficient funds are available for completion of the work.

Project work being performed by Minor Construction Forces is being delayed due to work stoppage. All material to be procured by Project Engineering is on order. The battery shop structure has been completed.

The bid assembly was prepared for issue.

CA-633 - Remodeling of Facilities - Kadlec Hospital

Project Preparation Complete: 100% Scoping Complete: 100%

Directive Completion Date: April 1, 1957
Total Authorized Funds: $ 90,000 - GE $3,210 - AEC $86,790
Total Estimated Cost $ 90,000

Design by the architect-engineer is in progress. Construction work is to be performed under two fixed-price contracts. One is for piping, the second is for remaining work included in the project, principally electrical items.

CA-639 - Painting Water Plant Structures - 100-DR

Project Preparation Complete: 100% Scoping Complete: 100% Prelim. Design Complete: 100%

	Scheduled	Actual
Detailed Design Complete:	100%	100%

Directive Completion Date: August 31, 1956
Total Authorized Funds: $ 75,000 - GE $8,500 - AEC $66,500
Total Estimated Cost: $ 75,000

The bid opening was scheduled for April 5, 1956.

DECLASSIFIED

DECLASSIFIED

DEL

CG-646 - Modifications to Pickling Machines - 313 Building

Project Preparation Complete: 100% Scoping Complete: 100% Prelim. Design Complete: 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.

A Project Section Work Authority was received on March 15, 1956, authorizing $49,500 for the Project Section work. The vendor's revised proposal was received on March 20, 1956 and is acceptable.

CA-649 FY 1956 Water Tank Replacements

Project Preparation Complete: 100% Scoping Complete: 100% Prelim. Design Complete: 100%

Directive Completion Date: February 28, 1957
Total Authorized Funds: $ 58,500 - GE $12,000 - AEC $46,500
Total Estimated Cost: $ 58,500

The General Electric portion of design is 65% complete and the target date for completion is April 13th. Detail design and tank construction are to be by fixed-price contract.

CA-650 - Replacement, Repair and/or Removal of Valve Houses - 100-B, D, & F

Scoping Complete: 100%

Directive Completion Date: December 31, 1956
Total Authorized Funds: $ 65,000 - GE $3,500 - AEC $61,500
Total Estimated Cost: $ 65,000

The architect-engineer is working on detailed design.

CG-658 - Shielded Personnel Monitoring Station - 747 Building Addition

Total Authorized Funds: $150.00

The AEC Project Review Board has rejected the project proposal as submitted, but the proposal has not been returned to the user.

CG-659 - Decontamination Facilities - 100-E, 200-W & 300 Areas

Total Authorized Funds: $ 1,000
Total Estimated Cost: $ 60,000

The AEC Project Review Board has disapproved the project proposal as presently scoped. The user, Employee & Public Relations Department, will decide the action to be taken on project proposal preparation after the Commission's letter is received.

CG-660 - Modifications & Additions to Metallographic Cell - Radiometallurgy Building

Total Authorized Funds: $ 20,000 (Interim Authorization)
Total Estimated Cost: $135,000

The Project authorization has been received. Purchase specifications are being prepared for material authorized by this release.

IR-191 - Building 321 - Fire Protection

	Weighted	Actual
Field Progress Complete: P.F.	100%	100%

Average Manpower: P.F. 2

Approx. Accumulated Manpower: (man-days) P.F. 2,210

Directive Completion Date: March 31, 1956
Total Authorized Funds: $ 19,000
Total Estimated Cost: $ 19,000

Final inspection was held on March 14, 1956, and the project was accepted with exceptions, by the user on that date.

The project close out notice is being prepared.

IR-200 - Graphite Machining Facilities - 300 Area

Project Preparation Complete: 100% Scoping Complete: 100%

	Scheduled	Actual
Detailed Design Complete:	100%	100%

Directive Completion Date: August 1, 1956
Total Authorized Funds: $ 18,700 - GE $4,850 - AEC $13,850
Total Estimated Cost: $ 18,700

Bid requests were issued March 27, 1956, with bid openings scheduled for April 17, 1956.

IR-202 - Lighting Improvements - 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 bid package is being assembled by the Atomic Energy Commission.

DECLASSIFIED

IR-204 - Office Addition to 141-M Building (ER-3135)

Project Preparation Complete: 100% Scoping Complete: 100% Prelim. Design Complete: 100%

Total Authorized Funds: $ 1,400
Total Estimated Cost: $ 15,000

The informal request was approved by the AEC Project Review Board on March 22, 1956. The information for architect-engineer services is ready for transmittal to the Commission as soon as the approval is received by the Project Section.

Job 0050 - Painting of Two High Tanks at 105-C

	Weighted	Scheduled	Actual
Field Progress Complete: F.P.	100%	100%	35% *

Directive Completion Date: October 15, 1955 *
Total Authorized Funds: $ 9,000
Total Estimated Cost: $ 9,000

* The contractor has been requested to submit a revised schedule which will indicate a continuation of work beginning the early part of April, 1956. Contract work was suspended during the winter months due to weather conditions.

Job 0068 - Addition to BY Telephone Exchange

Directive Completion Date: June 1, 1956
Total Authorized Funds: $ 4,150
Total Estimated Cost: $ 4,150

Detail design has been completed. Bids were opened March 14, 1956, and the contract award was issued to Frank Lohse on March 20, 1956.

ER-3122 - Replacement of Deaerator - 384 Building

Total Authorized Funds: $ 1,000

Manufacturing Department is to perform an additional series of operating efficiency tests before making a decision regarding project proposal preparation. It is not anticipated that funds for this work will be committed during FY 1956.

ER-3125 - Roof Repairs - Central Stores

Scoping Complete: 100%

Total Authorized Funds: $ 1,400
Total Estimated Cost: $ 26,000

This project proposal is being routed for approval signatures within the General Electric Company.

ER-3132 - Corrosion Testing Facilities - 314 Building

Project Preparation Complete: 100% Scoping Complete: 100% Prelim. Design Complete: 100%

Total Authorized Funds: $1,900

Minor changes to project proposal justification were made by the user, and the proposa continued through General Electric Company for approval signatures.

ER-3133 - Alteration of Laboratory Area Buildings

Scoping Complete: 100%

Total Authorized Funds: $ 2,000

The project proposal is being held for inclusion in the 1957 Budget.

ER-3134 - General Improvements - Central Stores & Transportation Areas

Scoping Complete: 100%

Total Authorized Funds: $ 1,800 *
Total Estimated Cost: $ 14,000

* $750 of these costs have been transferred to IR-202.

The informal request for improving the parking lot is being routed for General Electric approval signatures. All work for the improvement of the storage yard has been deleted.

ER-3137 - Evacuation Warning System - 300 Area

Total Authorized Funds: $ 900
Total Estimated Cost: $ 20,000

As requested by the user, no further action was taken during the present reporting period.

ER-3139 - Oil, Paint, and Solvent Storage Facility - 300 Area

Total Authorized Funds: $ 750

The user has requested that work scope be reduced. The rough draft of an informal request covering the new scope is in progress.

DECLASSIFIED

DECLASSIFIED

ER-3141 - Replacement of Obsolete Radio Communications Equipment

Total Authorized Funds: $ 1,000
Total Estimated Cost: $ 181,000

The project proposal is being routed for approval signatures within the General Electric Company.

ER-3143 - Improved Calibration Facility - 3745 Building

Project Preparation Complete: 100% Scoping Complete: 100% Prelim. Design Complete: 60%

Total Authorized Funds: $ 2,000
Total Estimated Cost: $ 22,500

The project proposal was transmitted to Financial Department on March 21, 1956.

ER-3144 - Feasibility Study of Flashing Light Signals at Major Plant Railroad Crossings.

Total Authorized Funds: $ 1,000 (Work Order A-21817)

Since the study was completed during February 1956, this order is being closed out.

ER-3145 - Centralized Maintenance Lunch & Locker Room Facilities - 100-B, D & F Areas

Scoping Complete: 60%

Total Authorized Funds: $ 2,000

Detail scope determination is in progress, based upon the use of the 1713 Buildings in B and D Areas and the two 1707 Buildings in F Area.

ER-3146 - Minor Construction Headquarters Consolidation Study

Total Authorized Funds: $ 1,000

The study was completed by March 30, 1956.

ER-3147 - Explosion-Proofing 321 Building

Total Authorized Funds: $ 500

The preliminary study and cost estimate have been completed. Manufacturing Department is reviewing this scope and estimate of $175,000, and is to request further action on the preparation of a project proposal.

ER-3148 - Modification of Trailers for Shipment of "J" Casks

Total Authorized Funds: $ 250

The trailer modification was delayed one week from the original completion date of March 16, 1956, because of the trucker sending in a trailer not of sufficient strength and also because of discussions with the trucker on a location for the casks.

The four sheetmetal covers are complete, and one trailer was essentially complete on March 21, 1956 when work stopped again because of the teamsters strike. No modification has started on the second trailer. The Atomic Energy Commission has relaxed modification completion dates because the Idaho Highway Department has banned indefinitely loads in the amount of the cask trailer.

ER-3149 - Minor Construction Stores Study

Total Authorized Funds: $ 300

A rough draft of the study has been completed.

ER-3150 - Building 306 Semiworks Line

Total Authorized Funds: $ 225
Total Estimated Cost: $ 400,000

A request has been received from the Design Section to assist in the preparation of a project proposal to install a semiworks line in the 306 Building.

DECLASSIFIED

D. Other 100 Area Projects

CG-558, Phase I - Reactor Plant Modifications for Increased Production

	Scheduled	Actual
Detailed Design Complete:	99%	100%
Field Progress Complete:	49%	53%

Total Authorized Funds - $25,900,000

Design and installation of zone temperature monitoring facilities for 100-B, C, D, DR, F, and H Areas, formerly a part of CG-558, Phase I, is now being done as project CG-666.

The teamsters, operating engineers, and cement finishers went on strike March 22, 1956. All Minor Construction work stopped on March 26, 1956. The above strike has had a limited effect on the fixed-price work, and the work has continued without serious delay to date.

Plant forces work is 80 per cent complete in the 151-B Building. All of the eight new cubicles have been installed and are connected to their respective busses. The temporary leads required for the 190-C pumps during the installation of the cubicles have been removed. Each of the new pumps for the 190-B Annex can now be connected permanently to the switchgear as required.

In the 181-B Building the #15 pump was installed with a rewound motor and operated for a 24-hour period. Excessive vibration was encountered; so the installation is being checked. As of this date five motors have being rewound.

The #8 filter controls are installed in the 183-B Building, and the preliminary calibration of the manual controls is complete. The maximum flow did not reach the design flow; therefore, the vendor has been requested to send his engineer to HAPO to inspect and calibrate one filter installation.

In the 190-B Annex pump unit #6 was bumped March 23, 1956, and completed its 24-hour test run on March 27, 1956. Pump unit #4 completed its test March 29, 1956. The covers were removed from pump #1, 3, and 8 to inspect the condition of the pumps. The inspection indicated that no foreign matter had been pumped. Seven of the eight pumps have been satisfactorily tested.

The plant forces have completed approximately 35 per cent of their work on the 151-D Building. The terminal cubicles have been installed, and the tie cables to the I.T.E. switchgear have been terminated and connected. The five superstructures required for switchgear modifications have been installed on the rear buss. Minor Construction will continue to install the new switchgear, and the cables have been laid in the trays. Most of the stress cones are prepared.

In the 181-D Building work will continue with the installation of temporary switchgear, transformers, and cables. Pump #16 has been removed, and the installation of #1 and #16 started.

DECLASSIFIED

CG-558, Phase I - Reactor Plant Modifications for Increased Production (Continued)

Minor Construction forces have completed the tie-in of the raw water lines.

A six-foot diameter hole was chipped through the cushion chamber wall and the 66-inch pipe stub set in place through this hole. Minor Construction installed the effluent line from the 105-D Building to the new 1904-D junction box.

In 190-D Annex, the third and final section of the 0'-0" floor slab was placed. Painting of structural steel was continued. The main bearing sole plates on equipment foundations #1, 4, 5, and 8 were installed.

In the 190-DR Pump Room #1 all the structural steel has been erected, and the 20-ton bridge crane was installed. The main sole plates are being installed on the equipment foundations. Installation of the bulb-tees was completed, and the glass insulating board on the roof is being installed.

Zonalite conrete was placed on the roof of the 190-DR Pump Room #2. The long-mix grout has been poured under the four motor sub-bases, and three of the motors have been placed.

CG-558, Phase II - Reactor Plant Modifications for Increased Production - 190-F and H Areas

	Scheduled	Actual
Field Progress Complete:	7%	10%

Total Authorized Funds - $11,200,000

The teamsters, operating engineers, and cement finishers went on strike March 22, 1956. Work was performed on a limited basis on the 22nd and 23rd. All Minor Construction work stopped on March 26, 1956, and the fixed-price contractor's construction is seriously affected. There has been no concrete placed since the strike started.

The 183-F flume modification work on one half of the filter plant was started during an area outage. The new concrete openings were completed, one mixing chamber gate was replaced, and four filter discharge lines were modified.

Excavation for the underground portion of the effluent system between 105-F and 107-F is approximately 20 per cent complete. All of the pipe has been moved to the job site.

The fixed-price contractor for the 183-F filter media replacement completed his filter work March 23, 1956, but the final clean-up and job acceptance has not been completed.

In the 190-F Annex the by-pass process sewer has been backfilled. Four of the concrete equipment foundations as well as the wall against the existing building were placed. Work was started on knocking down the wall of the existing tunnel for the architectural tie-in connection.

CG-558, Phase II - Reactor Plant Modifications for Increased Production - 100-F and H Areas (Continued)

The existing concrete sewer pipe has been filled with concrete. Equipment base foundations in the 190-H Annex have all been formed and poured. The west floor slab between equipment bases #4 and 5 has been poured. A portion of the contractor's work area was contaminated by inadvertent use of the process sewer in 105-H; so future work will require SWP procedures.

CG-600 - 100-C Alterations

	Scheduled	Actual
Detailed Design Complete:	100%	98.5%
Field Progress Complete:	1%	1%

Two check prints covering the installation of new process pumps in the 190-C pump house were prepared during March.

A review of process requirements has indicated the 190-C replacement pumps must be run-in during plant shutdowns. The total time and cost affects of this procedure are being studied to obtain the most desirable economic solution. It will probably result in a revised project proposal requesting additional funds and time for completion. Authorized funds are $675,000 for completion by April 15, 1957.

III. REPORT OF VISITORS

A. To Hanford, March 1956

None.

B. To Other Installations, March 1956

R. G. Kramer visited the Peter Kiewit Sons' Company in Portsmouth, Ohio, on March 5 to inspect metal shelvings and bins.

P. J. O'Neil and M. G. Patrick attended the spring meeting of the American Society of Mechanical Engineers in Portland, Oregon, March 18 to 21.

To review corrosion testing procedures and quality control procedures for our Eastern suppliers, L. L. Kleinhesselink visited the following companies March 19 to 28: Wallingford Steel Company, Lukens Laboratory, G. O. Carlson, Eastern Stainless Steel Company, Armco Steel Company, Babcock & Wilcox, and Allegheny Ludlum.

D. E. Newby visited Resistoflex Corporation in Rosedale, New Jersey, March 20 to review the inspection requirements on the Teflon connector order and attended a National Association of Corrosion Engineers conference in New York, New York, March 21.

H. H. Hubble visited DeLaval Company in Trenton, New Jersey, March 23 to 26 and Foxboro Company in Foxboro, Massachusetts, March 27 for engineering consultation and to expedite pump deliveries for CG-558.

DEC[redacted]IFIED

DECLASSIFIED

ADVANCE ENGINEERING SECTION
MONTHLY REPORT
MARCH 1956

A preliminary study has been made of the use of organic liquids for cooling Hanford type reactors, the principal advantage being the non-corrosiveness of these liquids for uranium and other pile materials. According to available information, the radiation damage of diphenyl will be a minor problem in Hanford reactors. The use of diphenyl in existing reactors appears attractive as compared with rear face pressurization with the use of water. The study is continuing with emphasis on application to new reactor designs.

A survey of future waste storage requirements has indicated that additional Purex waste storage may be needed in September 1958 but that additional Redox storage will not be required before September 1959. Sending Purex waste to Redox storage will entail additional expense.

F. W. Albaugh

Manager, Advance Engineering
ENGINEERING DEPARTMENT

FW Albaugh:PFG:pk

EMPLOYEE AND PUBLIC RELATIONS DEPARTMENT

MONTHLY REPORT SUMMARY - MARCH 1956

PERSONNEL PRACTICES SECTION

The number of applicants interviewed in March was 1,164 as compared with 1,039 for February. In addition, 125 new applicants applied by mail. Open, nonexempt, non-technical requisitions increased from 92 at the beginning of the month to 95 at month end. Eighty-two employees were added to the roll and 89 removed during the month. The separation rate for fiscal month of March was 1.00% and for fiscal month of February .80%. These rates when converted to annual rates are 10.43% and 10.43% respectively. During March 80 new requests for transfer to other type work were received by Employment and 40 transfers were effected. Attendance recognition awards were distributed to 114 employees in March, including three who qualified for six-year awards.

There were four employee deaths during the month of March. One hundred and seventy-one visits were made to employees confined to Kadlec Hospital, and 26 checks were delivered to employees confined at the hospital or at home. At month end participation in the Pension Plan was 98.9%, in the Insurance Plan 99.6%, and the Employee Savings and Stock Bonus Plan 54.2%. At month end there were 649 nonveterans registered under Selective Service and 719 military reservists were on the roll. Since August 1, 1950, 435 employees have terminated to enter military service, of which 179 have returned, 58 have not claimed re-employment rights, leaving 198 still in military-leave status.

Forty-eight adopted suggestions were approved for awards in March resulting in cash awards totaling $2,100 with a total net savings of $12,841.28. Since the beginning of the 1955-56 season, 243 offers have been extended to BS/MS graduates for the Personnel Development Program. There have been 38 acceptances to date. Acceptances have been received from 42 experienced candidates. To date 545 PhD cases have been considered, 217 have been invited to visit and 105 have accepted invitations to visit.

EMPLOYEE COMMUNICATIONS AND PUBLIC RELATIONS

Almost four times as many press releases have been prepared for regional distribution during the first quarter of 1956 as compared with the same period during 1955. An almost similar decline has occurred in the preparation of material for national distribution during the same period. Clearance of articles for publication has almost doubled, and clearance of speeches tripled.

During the month two high school groups visited the plant, and arrangements were completed to present HOBSO to the local High School economics class. Members of the Section cooperated with area schools in the presentation of the Science Fair. Two TV programs and news material helped to promote the Fair.

To help improve safety performance, the GE NEWS carried material on safety in every issue. The safety booklet for employees was revised, and the possibility of producing a motion picture on safety is being explored.

Requests for photographic services decreased during March. However, there was an increase in the number of identification prints processed.

The report, 1955 At Hanford, was completed during the month and distributed through Classified Files. In all, 312 plates were completed by Graphics.

UNION RELATIONS

On March 22, a work stoppage involving Teamsters, Operating Engineers,, and Cement Masons employed by J. A. Jones Company on minor construction activities and other lump sum contractors on the Project occurred over the matter of isolation pay and transportation from North Richland to the job site. Due to the absence of the three crafts, work in the Minor Construction project sub-section was affected and 74 temporary notices of layoff were given to GE employees effective March 30. Extensive efforts were made to place these employees on other work and some 40 notices of layoff were rescinded as of that date also.

The Hanford Atomic Metal Trades Council has requested arbitration of a one-day disciplinary layoff given each of two mechanics in Transportation who, through negligence and a breakdown in communications, pushed a bus through the closed door of a garage causing damage of approximately $800 and seriously endangering the safety of the driver of the bus who was in the process of opening the garage door. We have agreed to arbitrate this incident and an arbitrator will be selected in the very near future.

The BSEIU has moved out of their office in the Labor Temple and the affairs of the Union are being conducted in the home of Jeannette Mayhew who is continuing in the capacity of part-time representative of the group.

SALARY AND WAGE ADMINISTRATION

HAPO salary statistical data for inclusion in the Company semi-annual report were prepared according to the revised codes received during the month. The results of this work should make the Company report more useful as a means of comparing HAPO status with overall Company and as a control in the administering of exempt salaries.

The section continues to participate in salary and wage surveys conducted by others on both a National and Northwest area scale. During March, salary information was exchanged with one government agency, three government subcontractors and nine private concerns.

EDUCATION AND TRAINING

Fifteen graduate courses and fourteen college-level and vocational courses are currently being conducted in the spring term. Two college level courses had such a large enrollment that they were split to run two smaller normal-sized classes.

Transfers were accomplished during the month of the first group of technician trainees that completed their initial six months' assignment. Plans are under way to add an additional 25 to the program during the summer months.

HEALTH AND SAFETY

Additional followup and emphasis on the problem of overweight in employees has been begun as a result of 50% of the employees being 15 or more pounds overweight.

Plans and discussion with Dr. Horace Turner who will be Kadlec Hospital Administrator, have begun to move Industrial Medical facilities from Kadlec Hospital to the Medical-Dental Building.

There were no disabling injuries during the month. There were 375 medical treatment cases. The community had 25 medical treatment cases. A fire at the 271 BXR Tank Farm caused $37,000 damage.

HEALTH AND SAFETY (CONTIN.)

The action taken by supervision in conveying W. E. Johnson's desire to consider "Safety First" has been reflected by an improved quality of safety meetings, by a more comprehensive review of safety bulletins and the overall attitude toward accident cause control.

The average daily adult census decreased from 70.9 to 60.7 as compared with 60.1 a year ago. The average daily newborn census decreased from 9.9 to 8.8 as compared with 9.5 a year ago.

The Board of Trustees for Kadlec Hospital has been selected and Dr. Horace Turner has been named administrator by the National Board of Methodist Hospitals and Homes.

Dr. David B. Rowlett was appointed part time public health officer, and D. F. McCarthy replaced G. R. Yesberger as sanitarian. The incidence of communicable disease remained about the same as for the month of February. Significant changes were noted in measles which increased from 8 to 50 and whooping cough which dropped from 58 to 7 cases.

COMMUNITY SECTION

Fire destroyed the Pennywise Drug Store at Thayer Drive and Williams Boulevard on March 19, 1956. Damage was estimated at approximately $70,000. A thorough investigation conducted by Police and Fire Department officers resulted in the interrogation of an eight-year old boy who admitted setting the fire in the refuse box at the south end of the drug store building.

The Community Operations Sub-Section was dissolved during the month and functions reassigned within the Community Section.

AUXILIARY OPERATIONS AND PLANT PROTECTION SECTION

There were five fire alarm responses during the month. On March 5, 1956, a fire occurred in 271 BXR Building of 200-East area as the result of breakdown of a ground detector unit. Loss to instruments and equipment was approximately $37,000.

Security violations increased from 21 to 24. Outstanding unaccounted for documents were reduced from 194 to 192.

On March 13, 1956, HOO-AEC notified GE that as a result of a recent determination in their Washington office, no contractor personnel can be delegated authority to approve the use of two or more colors or illustrations in printing at Government expense. Under the U. S. Government Printing and Binding Regulations, the necessity and functional value of such printing must be certified by the agency in advance. The assistant to the Manager, HOO-AEC is now the representative set up to approve these classes of printing for HAPO.

Evaluation appraisal of the Plant Telephone System facilities was begun by R. W. Beck and Associates on March 21 in connection with special agreement SA-7.

The initial draft of a project proposal covering replacement and modernization of plant security radio facilities was completed by the Project Engineering Unit and reviewed by the Telephone Sub-Section.

AUXILIARY OPERATIONS AND PLANT PROTECTION SECTION (CONTIN)

Gas pressurization of the Kennewick and Pasco trunk cables was completed during the month.

HOO has submitted information to Washington office for use in compiling a "certificate of need" for new office building. It is understood that if this certificate is issued by Washington AEC, GSA will proceed with detailed study on the new building.

TB Pugh/ib
4/13/56

Employee and Public Relations

PERSONNEL PRACTICES

General

An order has been placed for the leather photo pass folders to be used as awards under the Attendance Recognition Plan and delivery has been promised by April 23. We continue to get indications from a number of sources that our exempt people are interested in some sort of an Attendance Recognition Plan for exempt people. We, of course, will continue to be alert to further developments in this area.

Some progress was made in the study of promotional procedures for nonexempt independent employees and the lay-off procedure for such employees, which is being made by a Study Team under the direction of C. N. Gross.

Employment

	February, 1956	March, 1956
Applicants interviewed	1,039	1,164

248 of the applicants interviewed during March were individuals who applied for employment with the Company for the first time. In addition, 125 applications were received through the mail.

	February, 1956	March, 1956
Open Requisitions:		
Exempt	1	2
Nonexempt	92	95

Of the 92 open, nonexempt, nontechnical requisitions at the beginning of the month, 37 were covered by interim commitments. Of the 95 open, nonexempt, nontechnical, requisitions at month end, 66 were covered by interim commitments. During March 77 new requisitions were received requesting the employment of 105 nonexempt, nontechnical employees.

	February, 1956	March, 1956
Employees added to the rolls	72	82
Employees removed from the rolls	77	89
NET GAIN OR LOSS	-5	-7

	Fiscal Month February, 1956		Fiscal Month March, 1956	
	Male	Female	Male	Female
Separations Rate:	.53%	2.01%	.70%	2.37%

	Fiscal Month February, 1956	Fiscal Month March, 1956
Over-all Separation Rate:	.80%	1.00%

During March, 20 employees left voluntarily to accept other employment, 3 left for business for self, and 2 left to enter military service.

Transfer Data

Accumulative total of requests for transfer received since 1-1-56	216
Number of requests for transfer received during March	80
Number interviewed in March, including promotional transfers	98
Transfers effected in March, including promotional transfers	40
Transfers effected since 1-1-56, including promotional transfers	150
Transfers effected in March for employees being laid off	4
Number of stenographers transferred out of steno-pool in March	5
Transfer requests active at month end	499

ADDITIONS TO THE ROLLS

	Exempt	Nonexempt	Community Firemen	Total
New Hires	6	43	--	50
Re-engaged	-	1	--	1
Reactivates	2	28	--	30
Transfers	1	--	--	1
Total Additions	10	72	--	82

TERMINATIONS FROM THE ROLLS

	Exempt	Nonexempt	Community Firemen	Total
Actual Terminations	11	29	--	40
Removals from rolls(de-activates)	2	45	--	47
Transfers	1	1	--	2
Total Terminations	14	75	--	89

GENERAL

	2-1956	3-1956
Photographs taken	537	758
Fingerprint impressions	110	89

PERSONNEL SECURITY QUESTIONNAIRES PROCESSED

	2-1956	3-1956
General Electric cases	81	107
Facility cases	15	24
Total	96	131

Employee and Public Relations

PERSONNEL PRACTICES

On March 12, 13, 14, and 15, a total of 48 seniors from the Columbia High School, accompanied by five of their teachers, made a tour of the 700 Area. The tour included a visit to the Weekly Payroll Unit, Monthly Payroll Unit, Plant Mail Unit, Telephone Sub-Section, Operations Unit, Stenographic Unit, and Procedures and Computing Section.

In connection with the recruitment for the Technician Training Program, the following high schools were contacted during the month: Toppenish, Yakima, Selah, Highland, Walla Walla, and Touchet. To date, a total of 17 schools have been contacted in this recruitment effort. Sixty-six applications have been received and 35 are now being processed.

During the month the following high schools were visited in connection with the recruitment of stenographic personnel: Sunnyside, Toppenish, Yakima, Selah, Highland, Pasco, Kennewick, Touchet and Walla Walla. A recruiting contact was also made at the Walla Walla Business College.

The Employment Representative-Women visited the University of Idaho on March 27 and Washington State College on March 28. Nine graduating secretarial science students were interviewed and numerous contacts were made with the members of the staffs at both schools to acquaint them with our program for secretaries. Persons interviewed seemed of high caliber and indicated considerable interest in General Electric.

Since the first of the year through March, 87 employees have been transferred to other components from the Separations Section.

Three craftsmen in the Community Section were transferred without replacements to other classifications and components in the Plant.

As a result of a current strike of J. A. Jones personnel, 74 of our employees were scheduled for furlough on 3-30-56. In an effort to place these people all major components of the Plant were canvassed. Forty-two were placed in temporary positions, 7 elected to take vacations and 4 preferred to take time off rather than accept temporary placement.

Personnel Records and Investigations	2-1956	3-1956
INVESTIGATION STATISTICS		
Cases received during the month	208	249
Cases closed	223	120
Cases found satisfactory for employment	206	236
Cases found unsatisfactory for employment	25	15
Cases closed before investigation completed	8	3
Special investigation conducted	5	0

Employee and Public Relations

PERSONNEL PRACTICES

PERFECT ATTENDANCE RECOGNITION AWARDS

Total one-year awards to date since January 1, 1950	5594
One-year awards made in March	36
Total two-year awards to date since January 1, 1950	3258
Two-year awards made in March	24
Total three-year awards to date	1966
Three-year awards made in March	21
Total four-year awards to date	1064
Four-year awards made in March	20
Total five-year awards to date	373
Five-year awards made in March	10
Total six-year awards to date	31
Six-year awards made in March	3

SERVICE RECOGNITION

Total Service Recognition Pins presented to date	5705
Five-year Service Recognition Pins presented during March to Exempt personnel	11
Five-year Service Recognition Pins presented during March to Non-exempt personnel	78
Ten-year Service Recognition Pins presented during March to Exempt personnel	1

During March, 7 people whose continuity of service was broken while in an inactive status were so informed by letter.

Employee Services

The following contacts were made with employees during the month:

Employee contacts made at Kadlec Hospital	171
Salary checks delivered to employees at Kadlec Hospital	25
Salary checks delivered to employees at home	1

At the end of the month, participation in the Benefit Plans was as follows as compared with last month's participation:

	FEBRUARY	MARCH
Pension Plan	98.8%	98.9%
Insurance Plan	99.6%	99.6%
Savings & Stock Bonus	54.0%	54.2%
Good Neighbor Fund	70.2%	71.3%

One employee retired during the month of March, namely:

Ora Berkshire	W 3221-6602	Normal Retirement

Employee and Public Relations

PERSONNEL PRACTICES

Employee Services, Continued

All matters pertinent to retirement have been discussed with this employee in order that he will be fully informed of his retirement benefits.

Two retired employees expired during the month of March, namely:

Clarence L. Hillman	3/20/56	Normal Retirement
Walter M. Scott	(Notified March 14)	"

All necessary arrangements will be made to settle matters of business existing between the Company and beneficiaries of the deceased.

Four employees expired during the month of March, namely:

Charles C. Gilman	3/8/56	W 2710-6166	Manufacturing
George E. Cooper	3/10/56	M 1525-6286	"
Clifford E. McClaran	3/12/56	W 6136-6372	"
Robert C. Nielson	3/31/56	W 7322-6713	"

Arrangements will be made to settle matters of business existing between the Company and beneficiaries of the deceased.

Since September 1, 1946, 190 life insurance claims have been paid totaling $1,341,999.56.

A total of 57 new employees attended Orientation Programs given by members of this group during the month of March. Of this number, 100% have signed up to participate in the Pension Plan, *98% have signed up to participate in the Insurance Plan, and 95% have signed up to participate in the Good Neighbor Fund.

*One employee is covered under her husband's Plan of Insurance.

Thirty-six letters were written in regard to matters concerning deceased employees.

Military Reserve and Selective Service

Total number of non-veteran employees subject to military service training through Selective Service System 649

Number Classified 1A	154
Number Classified 1AO	1
Number Classified 1D	56
Number Classified 2A	105
Number Classified 3A	237
Number Classified 4A	4
Number Classified 4F	89
Number Classified 2S	3
	649

Employee and Public Relations

PERSONNEL PRACTICES

Military Reserve and Selective Service

Number of Technically Trained & Engineering Personnel for whom deferments are currently being requested	112
Number of Non-Technically Trained & Engineering Personnel for whom deferments are being requested	4
	116
Accumulated total of deferments requested	1642
Accumulated total of deferments granted	1311
Current number of deferment requests pending	25
Current number of deferment requests denied	0
Current number of deferment requests granted	14

During Month of March

Number of deferment requests pending at Local Board Level		18
Number of deferment requests pending at Appeal Board Level		6
Number of deferment requests pending at Presidential Appeal Level	Total	1
		25
Number of deferment requests denied by Local Boards		0
Number of deferment requests denied by State Appeal Boards		0
Number of deferment requests denied by Presidential Appeal Boards	Total	0
		0
Number of deferments granted by Local Boards		14
Number of deferments granted by State Appeal Boards		0
Number of deferments granted by Presidential Appeal Board	Total	0
		14
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		79
Number of Selective Service vulnerable Technical Graduates Enlisted		1

Employee and Public Relations

PERSONNEL PRACTICES

Military Reserve and Selective Service

Number of Selective Service vulnerable Technical Graduates Drafted	0
Number of Technical Graduates called to active duty under R.O.T.C.	1
Reservists Data - Total Number of Reservists on Roll	
Number of Active Reservists	163
Number of Inactive Reservists	536
Number of employees in the National Guard	20
Total	719
Reservists and National Guard members subject to drills, tours of duty, Cruises, Summer Camp and/or weekly or monthly meetings	255
Military Service Leaves of Absence - August 1, 1950 thru March 31, 1956	
Reservists	134
Selective Service System-	293
Female Employees Enlisted	8
	435
Total number returned to roll	179

Reservists	77
Sel. Serv. Sys.	102
	179

Known number not claiming reemployment rights	58
Number of employees still on military leaves	198

EMPLOYEE AND PUBLIC RELATIONS DEPARTMENT

WORKMEN'S COMPENSATION AND SUGGESTION PLAN

Suggestion Plan	February	March	Total Since 7-15-47
Suggestions Received	255	284	19319
Acknowledgements to Suggesters	269	262	
Suggestions Pending Acknowledgement	23	45	
Suggestions Referred to Departments for Investigation	313	325	
Suggestions Pending Referral to Departments	34	48	
Investigations Completed and Suggestions Closed	285	235	
Suggestions Adopted - No Award	0	0	
Adopted Suggestions Approved by Board for Award	103	48	
Total Net Savings	$7,775.04	$12,841.28	
Total Cash Awards	1,420.00	2,100.00	
Total Number Suggestions Outstanding to Departments	544	563	

Cumulative suggestion statistics for the first three months of 1956, compared with the same period for 1955, are:

	1956	1955	Increase
Received	836	800	4.5%
Adopted	181	245	-26.1%
% Adopted	21.7%	30.4%	-28.6%
Awards	$4,685.00	$5,620.00	-16.6%
Savings	$28,285.00	$42,577.00	-33.6%
Award/Savings	16.6%	13.2%	25.7%

Life Insurance

Eighty-two requests for code information were received from insurance companies and investigation agencies and furnished during the month of February,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

	February, 1956	
	Long Forms	Short Forms
	52	403
	March, 1956	
	Long Forms	Short Forms
	28	365

Total since September, 1946 - 31,946

Claims reported to Travelers	February, 1956	March, 1956
	12	8*

Total since September, 1946 - 1,074

* Of the claims reported to Travelers Insurance Company during the month of March seven were property damage and 1 was a bodily injury claim.

EMPLOYEE AND PUBLIC RELATIONS DEPARTMENT

WORKMEN'S COMPENSATION AND SUGGESTION PLAN

Workmen's Compensation

Operations

a. Albert F. Baxter, 8002005 -- Date of Injury: 8-24-54; Employer: General Electric Company; Nature of Injury: Hearing loss left ear.

Mr. Baxter, a metal fabricator in the Metal Preparation Section, submitted a claim to the Department of Labor and Industries for loss of hearing in the left ear as a result of working with a lathe which produced a loud, high pitched noise. After an investigation and medical examination, the Department rejected the claim and he appealed to the Board of Industrial Insurance Appeals. A hearing was held in Richland on March 19, 1956. Mr. Baxter was represented by Mr. Ed Critchlow of the law firm of Critchlow and Williams, Richland. The lay portion of the claimant's case was presented and the matter will be continued for the claimant's medical testimony and for the necessary evidence on behalf of the Department and the employer.

b. Hearing Loss Cases.

Of the four hearing loss cases that were tried before the Board of Industrial Insurance Appeals, the Board ruled in favor of the claimant in one case only, that of Clifford T. Scofield, claim number 8001827. In its decision the Board found only that noise exposure at HAPO had caused some or all of Mr. Scofield's hearing loss and it was ordered that the claim should be remanded to the Department for a determination of the amount of the loss. On March 8, 1956, General Electric Company filed a Notice of Appeal to the Superior Court for Benton County from the Board order.

Construction

a. Joda Woods, 9006544 -- Date of Injury: 10-4-51; Employer: Atkinson & Jones; Nature of Case: Back injury.

Mr. Woods' claim was closed by the Department with a permanent partial disability award of 50% of the maximum allowed for an unspecified disability ($3000). He later applied for a reopening of his claim on the basis of aggravation and the Department denied his request. He then appealed to the Board of Industrial Insurance Appeals. His appeal was allowed, hearings were held, and on March 2, 1956, the Board entered its Decision and Order sustaining the Department's refusal to reopen the claim. The claimant has since appealed to the Superior Court for Franklin County. He is represented by Mr. Ed Critchlow, Richland attorney.

Liability Insurance

a. Milo Riste and Curtis Swearingen vs. General Electric Company, B-6835809 and B-6835841.

Messrs. Riste and Swearingen's attorneys have written to John Gavin, The Travelers' attorney, offering to settle the Swearingen case for $40,000 and the Riste case for $25,000. The proposed settlements have been discussed with the Travelers' Claims Manager and it was his feeling that any case has settlement value; however, the

Liability Insurance (Continued)

figures offered by the plaintiffs' attorneys are much higher than The Travelers would recommend considering. The plaintiffs' attorneys have also petitioned to amend their complaint, however the damages sought will not be altered by the amendment.

General

On March 14, 1956 a meeting was held in Olympia between representatives of the Department of Labor and Industries, the Atomic Energy Commission and General Electric Company regarding the method of reimbursing the Board of Industrial Insurance Appeals for services rendered HAPO at the Appeal Board level. It was agreed that some formula had to be determined inasmuch as General Electric Company does not contribute to the Accident Fund or the Medical Aid Fund from which amounts are appropriated toward Appeal Board costs. It was also brought out that some of the costs are borne by the General Fund and that an adjustment should be made for those monies obtained from the General Fund. It was agreed that the method proposed by the Department of Labor and Industries, namely, determining the number of warrants issued, was a good formula to use. However, financial representatives of the Department, the Atomic Energy Commission and General Electric Company plan to study the matter further.

Technical Personnel Placement

Personnel Development Program

Twenty-two schools were visited during the month, completing planned campus interviews for this season. This makes a total of 63 schools visited this year. Follow-up dinners for Region 6 have been held at Colorado A&M, Montana State, Washington State College, University of Idaho, University of Washington, Seattle University, University of California, Santa Clara, University of Southern California, U.C.L.A. and University of Utah, with excellent student reception. Follow-up dinners have not yet been given for Oregon State College, Stanford and University of Nevada.

During the month a total of 81 offers were extended, 14 acceptances and 29 rejections were received.

The following table summarizes Personnel Development Program recruiting to date.

Field	Offers Extended			Acceptances			Open Offers			Rejections			On the roll
	BS	MS	Total*	BS	MS	Total*	BS	MS	Total	BS	MS	Total	
Engineering:													
Chemical	70	5	75	11	1	12	40	3	43	19	1	20	7
Electrical	32		32	5		5	22		22	5		5	
Mechanical	64	2	66	9		9	41	1	42	14	1	15	3
Metallurg.	9	1	10	3		3	4	1	5	2		2	2
Science													
Chemistry	16	5	21	7	2	9	7	1	8	2	2	4	3
Physics	26	5	31	2	2	4**	21		21	3	3	6	3
Other	15	2	17	3	1	4	8	1	9	4	_	4	2
Totals	232	20	252	40	6	46	143	7	150	49	7	56	20

* Offers and Acceptances totals include 9 carry-over offers from the 1954/55 season of which 8 were acceptances not on the roll as of 9/1/55.
** One acceptance now rejected-called into military service.

Summer Program

To date 15 offers have been extended on our Summer Junior Program. Ten acceptances and 1 rejection have been received. Offers were extended to 14 Graduate Students with 4 acceptances and 6 rejections having been received to date, with 1 candidate reporting on the roll. Twelve offers have been made on our Summer Professors Program and we have received 7 acceptances and 1 rejection.

Experienced BS/MS Recruiting

Of the 391 new cases considered during the month of March, 79 were responses from newspaper advertisements which were signed off immediately. There are now 110 responses still to be considered which are not reflected in the submitted statistics. Resume advertising will continue, on a weekly basis, in the following papers until the middle of June: Seattle, San Francisco, Detroit, Chicago, Milwaukee, Minneapolis, Des Moines, Houston, Indianapolis, Kansas City, Los Angeles, Phoenix, St. Louis and Salt Lake City.

Thirteen invitations to visit were made this month and there have been 16 experienced candidates who visited the Hanford Operation. Twenty employment offers have been extended, with 8 offers accepted and 7 people placed on the roll.

A three-day field recruiting trip to Denver was conducted March 12, 13 and 14. Forty-one candidates were interviewed out of over 100 telephone contacts. Three offers for the Personnel Development Program have been extended and five possible experienced candidates were developed as a result of this effort. A trip to the Dugway Proving Grounds is planned for April 19 and 20 to interview military personnel who will be separated from the service during 1956. Follow-up interviews will be conducted in the Chicago area April 12, 13 and 14 as a result of the resume advertising responses to that date. Follow-up interviews will also be conducted in the Los Angeles and San Francisco areas sometime during April based on the results of the resume advertising.

The following table summarizes the experienced BS/MS recruiting to date:

Field	Cases Consid.	INVITATIONS Ext.	Visited	To Visit	Open Invitations	OFFERS Ext.*	Acc.*	Open*	OTR
Engineering:									
Chemical	53	19	16		1	13	9	1	6
Electrical	45	16	12	1	1	14	5	4	3
Mechanical	67	18	15		2	17	8**	5	4
Industrial	12	3	3			4	4		4
Metallurgical	23	7	4		2	3	1	1	
Civil	18	2	2			2	2		2
Geological	8	2	2			3	3		2
Science:									
Chemistry	65	10	7	2		15	10	2	9
Physics	48	10	3	1	4	3	2		2
Math-Statistics	94	9	4	3		4	3		2
Other:	542	10	8	-	-	22	15	1	12
Totals	975	106	76	7	10	100	62	14	46

* Offer totals include 24 carry-overs from the 1954/55 season of which 20 were acceptances not on the roll as of 9/1/55, and 4 were open offers at that time.

** One former acceptance has now rejected employment proposal.

PhD Recruiting

During the reporting period the following action occurred:

	New	Experienced	Totals
New cases considered	17	9	26
Invitations extended	28	0	28
Invitations accepted	25	0	25
Candidates visited	24	1	25
Offers extended	5	0	5
Offers accepted	0	0	0
On the roll	1	0	1

The following table gives a comparison of the 1954-55 and 1955-56 season totals for new and experienced PhD's.

	1954-55	1955-56	% change 1955-56
Candidates considered	467	545	+16.7
Invitations extended	161	217	+34.8
Invitations accepted	94	105	+11.7
Candidates visited	51	76	+49.0
Offers extended	17	21	+23.5
Offers accepted	6	4	-33.3
On the roll	6	8	+33.3

There are currently 64 open invitations, 8 open offers, and 42 candidates who have accepted invitations but who have not yet visited for interviews.

Conducting PhD candidate interviews in the 3760 Bldg. study rooms has been reinstituted on a trial basis with GE security escort remaining with the candidates at all times while they are inside the plant perimeter barricade. Presumably this system will be continued until final determination of the problem has been made.

Terminations

Losses of technical and/or exempt personnel totalled 14 for March. These included 2 who transferred to other General Electric installations, 8 who left for other jobs, 1 to go into business for himself, 2 to enter military service and 1 who was deceased.

Employee and Public Relations Department

EMPLOYEE COMMUNICATIONS AND PUBLIC RELATIONS

During the month of March, Press Relations issued 43 releases. The breakdown by category, distribution and content was as follows:

SUBJECT		DISTRIBUTION	
Administration and Legal	1	Hanford Area	29
Organization Changes	6	West Coast Area	11
Employee Benefits & Pay	5	National	3
Union Relations	2		
Employment Services	7	CONTENT	
Plant Services	2		
Technology and Research	11	Information	3
Health, Medicine & Sanitation	2	Pictures	5
Education and Library	2	Short	35
Good Will	2	Long	0
Richland & Hanford Protection	3		

Activity in the release of information is down slightly for the first quarter of 1956 as compared with the same period during 1955. However, the major difference noted is a shift of emphasis from supplying information to national media to supplying material for regional publications. The comparative figures for the periods are:

	Local Releases	Regional	National
1955	99	9	32
1956	90	33	9

There has been a substantial increase in the number of articles cleared for publication so far this year. During the first three months, 27 such articles received all required approvals — 15 during the month of March. During the first three months of 1955, only 16 articles were approved.

A similar, although larger, increase has been noted in the number of papers cleared for presentation at meetings by Hanford speakers. A total of 16 were cleared during March, and this brought the quarter's total to 29 as compared with 10 for the first three months of 1955. Most of the papers cleared during March are for presentation during the months of May and June.

Arrangements were completed for seven speakers to appear before service organizations, professional groups and other organizations during the month. Six of these were for March and one is for June.

Several projects were conducted during the month to help further our Community Relations objectives. On Tuesday, March 27, a group of Sunnyside High School math students and teachers toured the procedures and computing facilities. The group heard talks by personnel of Procedures and Computing and Operations Research. They also viewed the 702 computer. A question and answer period concluded the tour and meeting.

A group of Columbia High School students who plan to study audio-visual communications work during their college years visited the Audio-Visual Communications Unit. A demonstration of the operation of the equipment was conducted, and a

round table discussion was held.

Arrangements have been completed for a member of Education and Training to present the long version of HOBSO to Columbia High School economics students. Attempts to introduce HOBSO into school curriculum were begun about two years ago.

To promote employee interest in community affairs the GE NEWS carried information regarding the municipal election held on March 13, as well as information relating to disposal. Two brochures concerning items on the ballot were also prepared and distributed to Richland residents.

In addition, members of the Section contributed both time and talents to the promotion of the Science Fair held at Columbia High School. News material was prepared for the local press and for the GE NEWS. One edition of the Science Forum on television was devoted to a display of some of the students' exhibits and to a discussion of the exhibits by the students and the regular panelists of the show.

One edition of the television show, This Week at Hanford, was devoted to a further exhibit and discussion of the Science Fair.

The panelists and moderator of the Science Forum acted as judges of the Fair, and another member of the Section acted as publicity chairman. These were carried out as extra-curricular contributions on the parts of the individuals involved.

Efforts of members of the Section, the Army and the local TV station were combined to produce and publicize a Science Forum program about the guided missile, NIKE. A NIKE was displayed and its functions explained.

Members of the Section also donated portions of their after hours time to the local Red Cross Drive and will be doing the same in the upcoming Cancer Drive. During Holy Week a member of the Section appeared in a television production of a scene from Saint Claudia. The same presentation was given at the noontime meeting of the Richland Kiwanis Club.

It has been decided to discontinue the radio production of Science Forum. The decision was reached after a conference with KWIE management at which time it was agreed that the program did not conform with today's concept of public service radio programming either locally or nationally. The discontinuance of this radio version will permit us to concentrate our efforts on the TV version of the program.

Our other radio program, Inside Hanford, will be continued indefinitely.

In all, five telecasts of This Week at Hanford, which appears on the closed circuit of the Richland TV Cable Corporation, were presented. Emphasis in this program is continuing to be placed on local and plant personalities and events.

Material was published during the month in each issue of the GE NEWS urging safe practices on the part of employees. In addition, revisions have been completed on the booklet, Safety Is Part of Your Job, which is given to every new employee.

Employee and Public Relations Department

EMPLOYEE COMMUNICATIONS AND PUBLIC RELATIONS

Further exploration of the possibility of producing a motion picture on safety has been undertaken. A complete proposal including cost figures, methods of production and scenario treatment has been prepared.

Tape recordings were prepared for the use of one of the Manufacturing Sections in an IF Day safety program. The possibility of using such recordings throughout the plant in safety promotion is being explored.

It is also quite possible that safety publications will be made available through the information racks around the plant. These would be booklets and pamphlets published by information rack services as well as some material made available to plants from the New York Services organization.

Material for these racks would not be limited to safety information, but would include basic economic information, health information, cost and waste reduction material, information on operating efficiency, etc. Departments interested in this material would receive it from this Section and distribute it through their information rack locations.

To help improve job understanding and satisfaction among employees three features were published in the GE NEWS. One was on the work of the people of Pile Materials; one on the work and people of the Electrical Utility Section, and another on the inspection of underwater facilities at the plant.

A story board and two samples of finished art work have been completed on the proposed slidefilm, Understanding People, which is being prepared at the request of Industrial Health. Purpose of the film is to give Hanford supervision a better understanding of emotional health and the basic desires of people.

Requests for photographic services decreased from 379 in February to 331 in March. One hundred and 80 fewer negatives were exposed and 1,322 fewer prints processed than in the previous month.

There was, however, a large increase in the number of identification prints processed — 18,447 as compared with 11,092 in February.

As a result of this identification work, $12,191 was liquidated for the month. This unusually high liquidation rate should reach a more normal figure during the next few months, as the identification rephotographing assignment is completed and the work load becomes more normal.

An inventory of photographic equipment is being conducted throughout the plant. After inventory is completed, a careful examination will be made to see what materials should be excessed and what salvaged to keep our inventory at a reasonable figure and still provide the equipment needed.

Further photography details are included in the attached statistical report.

Distribution of graphics assignments and a statistical summary are included below:

Employee and Public Relations Department

EMPLOYEE COMMUNICATIONS AND PUBLIC RELATIONS

Distribution of Graphics March Assignments	Percent
General Administrative (Including Operations Research)	—
Employee and Public Relations	25
Engineering	33
Manufacturing	22
Financial	8
Radiological Sciences	10
Atomic Energy Commission	2
	100

	February	March
Total assignments completed	50	46
Total assignments backlog	41	45

Graphics Statistical Summary	Graphs or Charts	Illustrations	Other
Report Material (Includes Technical Publications)	45	3	15
Technical or Scientific Illustrations	—	20	1
Mechanical Art (Flow charts, schematics, maps, etc. - not for publication)	55	1	16
Lecture Material (Includes plates for slides)	33	2	--
Posters	1	—	1
General (Posting of current data, assembly, revisions, etc.)	89	1	29
	223	27	62

Total plates completed - 312

Layouts of charts, schematic drawings and other related photo-copy work for the Biology Section's Annual Report were completed this month.

Also completed was the report, 1955 at Hanford. The report was distributed through Classified Files on March 21.

Approval has been obtained from the Design Section to proceed with the construction on the 313 Building Scale Model. Equipment and material take-offs from blueprints and other sources have been made and orders for procurement of items required from off-site processed. All portions of the project were either ahead of or on schedule at the end of the month.

A series of eight large drawings illustrating details of the 105 H moderator and that of the 105 B, D and F reactors were prepared for the Reactor Section. These drawings specifically detailed the salient features of the graphite lay-up and keying arrangements. They are expected to be of considerable value in studying problems encountered in the CG—558 Tube Replacement Program.

EMPLOYEE COMMUNICATIONS AND PUBLIC RELATIONS

Three illustrations of the 105 K vertical rod safety system also were prepared for the Reactor Section, as well as an illustration of the proposed changes to be made in the fabrication of the new reactor discharge tip-off unit.

These are only a few of the 312 plates completed by Graphics during the past month, some on a rush basis which made it difficult to keep overtime within budgeted limits during the first quarter of the calendar year. Complex assignments requested on Thursday or Friday for completion on Monday morning coupled with the customer's failure to understand the manhours and detail which go into the preparation of charts, graphs, perspective drawings and other graphics materials are only two of the complicating factors.

The quarter's budget for overtime was exceeded. There is some hope that the next quarter may see some improvement in this, however. The creation of better understanding by the customer of the limitations under which such work is performed should help somewhat in getting work scheduled as far in advance as possible. However, no immediate solution can be foreseen. Should the work load continue to increase or even remain at the present level, it will be desirable to examine more closely manpower requirements for the years ahead. Meanwhile an attempt is being made to evaluate jobs accomplished, including overtime necessary, in relation to production savings realized or problems solved.

PHOTOGRAPHY UNIT MONTHLY REPORT MARCH, 1956	Requests	2" X 2"	2" X 4"	4" X 5"	5" X 7"	8" X 10"	8½" X 11"	11" X 14"	16" X 20"	N E G.	35mm Color Slides	35mm B&W Slides	3¼" X 4" Color Slides	3¼" X 4" B&W Slides	16mm M.P. Film
EMPLOYEE & PUBLIC RELATIONS	2	3				28									
PERSONNEL PRACTICES															
Technical Recruit.	1									4					
EDUCATION & TRAIN.	3		2			1				4					
Train. & Develop.	1					3				2					
Technician Train.	5					87				64					
EMP. COMM. & PUBL. RELATIONS	2		1			3				13					
Public Comm.	47		150	14	40	134				83					
Audio-Visual	7				13	43		6		29					
Empl. Comm.	47		22	6	14	133				179					
Graphics	2					7	1								
AUXILIARY OPER. & PLANT PROTECTION															
Security & Patrol	1					2				3					
Security Audit & Investigation	4	18449													
COMMUNITY															
Fire	6			41	12										
Police	6		66	14		20									
HEALTH & SAFETY	1					10									
Safety & Fire Prevention	4					113				20				6	
Public Health	1									18	11				
ENGINEERING															
DESIGN															
Process Engr.	6					17	112			17				2	
Design Engr.	10					24	149			30			1	10	

PHOTOGRAPHY UNIT
MONTHLY REPORT
MARCH, 1956

	Requests	2" X 2"	2" X 4"	4" X 5"	5" X 7"	8" X 10"	8½" X 11"	11" X 14"	16" X 20"	N E G.	35mm Color Slides	35mm B&W Slides	3¼" X 4" Color Slides	3¼" X 4" B&W Slides	16mm M.P. Film
PROJECT															
Inspection	1			1											
Project Engr.	10					8	280			2 83					
ENGR. ADMIN.															
Tech. Info.	1						14								
PILE TECH.															
Physics Research	3				9		3								
Metal Res.	27			553	128	26	952			3 80				2	
Pile Materials	7			12		67	39			27					300'
Pile Engr.	2						176			14					
Fuel Technology	37			517		21	986	1690		188			11 13		
SEPARATIONS TECHNOLOGY	1						13								
Chem. Devel.	2						27			6					
Plant Processes	1						75								
Chem. Research	5			31			346			46					
MANUFACTURING															
REACTOR	1						135			4					
Process	1						10								
Proj. & Special	1						180								
Reactor Maintenance	3					2	24			1					
Projects & Personnel	2					63				6					
Developing															
SEPARATIONS	2			16		51				44					
Rad. Mon.	1						8								
Shops Unit	1					28				8					
Industrial Engr.	2														
METAL PREP.	14	7		2	222		54			31			12		

PHOTOGRAPHY UNIT
MONTHLY REPORT
MARCH, 1956

	Requests	2" X 2"	2" X 4"	4" X 5"	5" X 7"	8" X 10"	8½" X 11"	11" X 14"	16" X 20"	N E G.	35mm Color Slides	35mm B&W Slides	3¼" X 4" Color Slides	3¼" X 4" B&W Slides	16mm M.P. Film
T PLANT	6			28		15	131			75					
TRANSPORTATION	2					30				10					
PURCHASING & STORES	6				6	37				23				12	
FINANCIAL	3	1					6								200'
RADIOLOGICAL SCIENCES															
RADIOLOGICAL RECORDS & STANDARDS	6	2		42	41		33			4					
BIOPHYSICS	5					30	52			28		2		3	
BIOLOGY	8					2	12			81			40	12	
RADIOLOGICAL ENGR.	1						60								
RADIOLOGICAL ADMIN. & COMMUNICATIONS	2	2								72	20		20		
A.E.C. PROP. MAN.	2						21								
A.E.C. SAFETY	8			7	4	68	9								
A.E.C. SECURITY	3	3				20									
TOTALS	331 18467		241	1284	489	1093	3908	1696	0	1302	31	2	61	83	500'

	JANUARY	FEBRUARY	MARCH
TOTAL ASSIGNMENTS	300	379	331
TOTAL NEGATIVES	1,128	1,482	1,302
TOTAL PRINTS	11,450	21,145	27,178

Employee and Public Relations

UNION RELATIONS

A work stoppage involving Teamsters, Operating Engineers, and Cement Masons employed by J. A. Jones Company on minor construction activities and other lump sum contractors on the project occurred on Thursday, March 22. The issue involves the matter of isolation pay and transportation from North Richland to the job site. No picket lines have been established but the absence of the three crafts has effectively caused a discontinuance of most construction work. Seventy-four GE employees working in the Minor Construction Project Sub-Section have been given a notice of temporary layoff to become effective at the conclusion of work on Friday, March 30. Extensive efforts have been made to place as many of these employees on other work as we can, and at this writing some 40 notices of layoff have been rescinded. The strike settlement has not developed to a point where any intelligent estimate can be made regarding its possible duration.

The Council has requested arbitration of a one-day disciplinary layoff given each of two mechanics in Transportation who were involved in an incident of safety violation and destruction of Government property. The two employees, following the standard procedure of using a Dodge power wagon to push the bus into the garage, through negligence and a breakdown in communications pushed the bus through the closed door causing damage of approximately $800 and seriously endangering the safety of the driver of the bus who was in the process of opening the door. We have agreed to arbitrate this incident; the first under our new contract language. A meeting is scheduled for next week to select an arbitrator and to iron out the details of proceeding with the matter. The Company's position is considered to be sound and defensible.

The unrest and internal friction within the HAMTC generated by our recent contract negotiations continues to manifest itself in our relationships. The Council is unusually aggressive and appears to feel the need for demonstrating this fact to their membership. Peculiarly, the problems that are arising involve interpretations of contract language which has been time-tested as a part of the contract for many years. Few problems are arising as a result of new language negotiated in 1955. It appears probable that pressure from the various local unions upon the Council will result in an increasing number of arbitration cases in the months immediately ahead.

The BSEIU has moved out of their office in the Labor Temple and the affairs of the Union are being conducted from the home of Jeannette Mayhew who is continuing as the part-time representative of the group. The move undoubtedly is necessitated by decreasing membership and funds.

Grievance Statistics:

A total of fifty-four (54) grievances were received and five (5) Step II grievance meetings were held during the month. A breakdown of the grievances received and processed follows:

ALL DEPARTMENTS

	HAMTC	HGU	BSEIU	Total Unit	Total Nonunit	Total
Received this month	49	0	0	49	5	54
Received this year	144	2	0	146	11	157

UNION RELATIONS

ALL DEPARTMENTS (Cont'd.)

	HAMTC	HGU	BSEIU	Total Unit	Total Nonunit	Total
Step I						
Pending February 29	0	0	0	0	0	
Settled this month*	38	0	0	38	0	38
Settled this year	96	3	0	99	2	101
Pending March 31	0	0	0	0	0	
Step II						
Pending February 29	65	0	0	65	1	
Settled this month**	10	0	0	10	3	13
Settled this year	47	2	0	49	7	56
Pending March 31	64	0	0	64	2	
Arbitration						
Pending February 29	1	0	0	1	0	
Settled this month	0	0	0	0	0	
Settled this year	0	0	0	0	0	
Pending March 31	2	0	0	2	0	
Total settled this month	48	0	0	48	3	51
Total settled this year	143	5	0	148	9	157

BY DEPARTMENTS

	Received		Settled Step I*		Settled Step II**	
	This Mo.	This Year	This Mo.	This Year	This Mo.	This Year
Manufacturing						
Reactor - Unit	24	66	19	44	6	19
- Nonunit	1	1	0	0	1	1
Separations - Unit	10	44	11	34	3	22
- Nonunit	2	5	0	1	0	3
Metal Preparation - Unit	8	17	6	9	1	3
Transportation - Unit	1	4	1	2	0	2
Electrical Utilities - Unit	1	1	0	1	0	0
Employee & Public Relations						
Community - Unit	0	2	0	2	0	0
Aux. Ops. & Plt. Pro. - Unit	3	8	0	5	0	3
Radiological Sciences - Unit	2	4	1	2	0	0
Engineering - Nonunit	2	3	0	0	2	2
Financial - Nonunit	0	2	0	1	0	1
Total	54	157	38	101	13	56

*Grievances brought to Step II prior to January 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 January 1, 1956, are, for the purpose of this report, considered settled at Step II.

Employee and Public Relations

UNION RELATIONS

BY SUBJECTS

	Manufacturing		Emp. & Pub. Relations		Radiological Sciences		Engineering		Financial	
	This Mo.	This Year	This Mo.	This Year	This Mo.	This Year	This Mo.	This Year	This Mo.	This Year
Unit										
Jurisdiction	14	51	1	3	0	0				
Health-Safety-San.	2	4	0	0	0	0				
Hours of Work	2	4	0	1	0	0				
Overtime Rates	18	45	0	2	2	3				
Vacations	1	2	0	0	0	0				
Seniority	4	7	0	1	0	1				
Wage Rates	2	4	1	1	0	0				
Miscellaneous	1	7	1	2	0	0				
Sick Leave	0	6	0	0	0	0				
Continuity of Service	0	1	0	0	0	0				
Grievance Procedure	0	1	0	0	0	0				
Nonunit										
Wage Rates	2	4	0	0	0	0	1	1	0	1
Miscellaneous	1	1	0	0	0	0	1	2	0	1
Sick Leave	0	1	0	0	0	0	0	0	0	0
Total	47	138	3	10	2	4	2	3	0	2

Employee & Public Relations

SALARY & WAGE ADMINISTRATION

In addition to the normal flow of routine work in Salary & Wage Administration, the following work was conducted during March:

1. Concurrence to the revisions made in the Salary Administration Manual was received from the AEC and the Manuals were issued.

2. Graphical analyses of the recent exempt employee performance appraisals were prepared showing data by departments and for total HAPO.

3. Considerable time and effort were expended by various members of the Section in connection with the HAPO reorganization study. Functional organization charts for the first two levels below the General Manager were prepared.

4. HAPO salary statistical data for inclusion in the Company semi-annual report were prepared according to the revised codes received during the month. The results of this work should make the Company report more useful as a means of comparing HAPO status with overall Company and as a control in the administering of exempt salaries.

5. Study of the rates currently being paid in industry to electronic data processing machine workers is continuing. To date useful information has been received from 11 of the 35 organizations contacted.

6. The Section continues to participate in salary and wage surveys conducted by others on both a national and Northwest area scale. As an indication of the scope of this activity, during March salary information was exchanged with one government agency, three government sub-contractors and nine private concerns.

7. The report on the first-line supervisory pay differential study is now in draft form and should be ready for issue during the coming month.

8. Area wage rate offices were established in the 100 and 200 Areas. It is anticipated that more effective services will be provided as a result.

9. The only organization change effected during the month eliminated the Community Operations Sub-Section and realigned the functions of the group within the Community Section.

Employee and Public Relations Department
EDUCATION AND TRAINING SECTION

SCHOOL OF NUCLEAR ENGINEERING

SPRING TERM

Fifteen graduate courses and fourteen college-level and vocational courses are currently being conducted in the spring term. Two college-level courses had such a large enrollment that they were split to run two smaller normal-sized classes.

Total of 478 students are paid up, leaving just nine who have made arrangements to pay by the first of the month. This makes this year's spring enrollment the largest spring registration in the school's history.

FALL TERM

Eighty-three per cent of the students completed their course work during the fall semester. This figure continues to vary between 80 and 85% even though there is a larger enrollment.

VISITS

On March 7 and 8 five faculty members of the University of Idaho visited Richland to register and counsel with 65 students. The visiting members were:

Dr. L. C. Cady, Dean of the Graduate School
Dr. W. H. Cone, Chairman of Physical Sciences Department
Dr. M. L. Jackson, Head of Chemical Engineering Department
Dr. J. J. Miller, Head of Physics Department
Prof. N. F. Hindle, Head of Mechanical Engineering Department

APPROVALS

Oregon State College, by action of the Graduate Council, has approved the current spring graduate courses for credit. The University of Washington has approved our college-level courses for credit.

JUNE GRADUATES

If the students finish their thesis work in the next few weeks, there could be ten men receiving M.S. degrees this June.

Employee and Public Relations Department
EDUCATION AND TRAINING SECTION

The following Personnel Development Courses were presented during the period between February 25 and March 25:

COURSE	NUMBER OF TIMES PRESENTED	NUMBER IN ATTENDANCE
Principles and Methods of Supervision	1	13
Job Relations Development	6	67
Presupervisory	4	46
Conference Leading	2	26
Responsibilities of a Supervisor (McGregor)	9	120
Cost Control	1	17
Labor Management Relations	1	24
Report Writing	2	28
Secretarial-Stenographic	1	22
Safety Consciousness	1	30
Customer Relations	3	49
Job Instruction Training (second meeting of course)	1	5
(third meeting of course)	1	7
Effective Human Relations (second meeting of course)	2	24
Job Methods Improvement (third meeting of course)	1	6

Tentative arrangements have been made to present HOBSO I (3 hr. session) to the senior economics class at Columbia High School.

Due to 45 people on waiting list for Report Writing, we have scheduled seven additional meetings for April, May and June. We have also had to schedule additional meetings on April 24 and May 15 to accommodate the large waiting list for Cost Control.

On March 19 R. B. Shoen presented a paper, prepared by R. E. Curtis, on "Professional Development of the Young Engineer" to the American Society of Mechanical Engineers in Portland, Oregon.

March 30, 1956

EMPLOYEE AND PUBLIC REATIONS DEPARTMENT
EDUCATION AND TRAINING SECTION

MONTHLY REPORT FOR MARCH 1956

PERSONNEL DEVELOPMENT PROGRAM FOR NUCLEAR ENERGY

I. Present Assignments

Department	Last Month	This Month
Engineering		
Pile Technology	13	12
Separations Technology	7	5
Design	2	1
Project	10	9
Manufacturing		
Metal Preparation	2	2
Separations	8	10
Reactor	8	6
Electric Utility	1	0
Production	1	1
Employee & Public Relations		
Education and Training	1	0
Financial		
Procedures & Computing	2	4
Total	55	50

II. Permanent Placements

There were three placements off the program as follows:

Separations Technology	- 1
Reactor	- 2
	3

III. Additions

There were no additions to the Program during the month of March.

IV. Selective Service

There were no losses to the armed forces due to selective service during the month.

One technically trained man on the Personnel Development Program entered the Air Force due to ROTC training commitments in college.

During the past five years we have had 49 men enter the armed forces due to officers training in college and 16 have now returned to the Company.

A total of 68 men have entered the armed forces due to Selective Service in the past 2½ years. Approximately 25 of this group are scheduled to be released from the armed forces this year, and we anticipate from our correspondence with these men that about 20 will return to our employment. The other five will probably enter a school for advanced degrees. We continue to keep in contact by correspondence with all men in military service and undoubtedly this is a big factor in maintaining their interest.

V. Housing for Single Men

Approximately 40 young technically trained men are now housed in several different dormitories. An informal survey of this group indicated that 15-20 would be interested in housing in a separate dormitory set aside for these people. A majority of these people indicated no interest in moving at this time since they are planning to move into apartments. A study is now under way to determine the approximate number of single men who will be reporting in June and July, and if this number is sufficient, it is planned to request Housing to designate a particular dormitory for housing this group.

TECHNICIAN TRAINING PROGRAM

Transfers were accomplished during the month of the first group of technician trainees that completed their initial six months' assignment. With one exception, all 24 were transferred on March 12 to their new assignments. Plans are under way to add an additional 25 to the program during the summer months. As previously, first consideration will be given to present employees, and a publicity program designed to acquaint employees and supervision with our present needs is under way.

EMPLOYEE & PUBLIC RELATIONS DEPARTMENT
HEALTH & SAFETY SECTION
MARCH 1956

General

Personnel Changes

Twelve additions and 8 deletions resulted in an increase of 4, with a total of 219 employees.

Employee Relations

Employee attendance at 54 meetings was 361.

Visits

Dr. Fuqua attended a seminar for industrial physicians at the Menninger Foundation, Topeka, Kansas, which dealt with the practical application of psychiatric knowledge and skills in the industrial setting.

Industrial Medicine

Additional followup and emphasis on the problem of overweight in employees has been begun as a result of 50% of the employees being 15 or more pounds overweight.

Plans and discussion with Dr. Horace Turner who will be Kadlec Hospital Administrator, have begun to move industrial medical facilities from Kadlec Hospital to the Medical-Dental Building.

Safety and Fire Prevention

There were no disabling injuries during the month. There were 375 medical treatment cases. The community had 25 medical treatment cases. A fire at the 271 BXR Tank Farm caused $37,000 damage.

The action taken by supervision in conveying W. E. Johnson's desire to consider "Safety First" has been reflected by an improved quality of safety meetings, by a more comprehensive review of safety bulletins and the overall attitude toward accident cause control.

Kadlec Hospital

The average daily adult census decreased from 70.9 to 60.7 as compared with 60.1 a year ago. The average daily newborn census decreased from 9.9 to 8.8 as compared with 9.5 a year ago.
The Board of Trustees for Kadlec Hospital has been selected and Dr. Horace Turner has been named interim administrator by the National Board of Methodist Hospitals and Homes.

Public Health

Dr. David B. Rowlett was appointed part-time public health officer, and D. F. McCarthy replaced G. R. Yesberger as sanitarian. The incidence of communicable disease remained about the same as for the month of February. Significant changes were noted in measles which increased from 8 to 50 and whooping cough which dropped from 58 to 7 cases.

HEALTH & SAFETY SECTION

MARCH 1956

Industrial Medical Services

Dispensary visits increased from 5,492 in February to 6,295. There were 467 job connected injuries treated but no disabling injuries for either General Electric or contractor employees. There were 30 nurses on the non-exempt roll providing dispensary services in ten different locations.

Examinations also increased from 1,006 in February to 1,169. There were 842 for General Electric employees and 327 for contractor employees.

There was one information meeting held during the month for industrial physicians.

Dr. Fuqua attended a seminar for industrial physicians on "Maintaining Emotional Health" at the Menninger Foundation, Topeka, Kansas, March 5th through 9th. The seminar dealt with the practical application of psychiatric knowledge and skills in the industrial setting.

Efforts continued to reinforce followup on weight control in employees. The Health Activities Committee met on March 15th and discussed ways and means to point out the seriousness of this health problem which is a problem to one-half of the employees.

When the Methodists take over the operation of Kadlec Hospital it is desired to move industrial medical services to the Medical-Dental Building. The Medical-Dental Building is close enough to permit continued use of Kadlec Hospital x-ray and laboratory facilities. Such a move would remove the need for expanding and remodeling Kadlec Hospital space and provide adequate space for all functions separate from the hospital operation.

Sickness absenteeism was 2.11% for the month of February.

Net costs for the month of February decreased approximately $1,000 from the January level, due to lower salary costs brought about by the short month for non-exempt salaries. Nearly all categories of cost were under budget during the month resulting in a budget underrun of approximately $3,500. On a year to date basis, net costs are approximately $6,000 (2%) less than budgeted.

Costs-Operations

	Feb.	Jan.	Increase (Decrease)
Salaries	$32,433	$35,578	$ (3,145)
Continuity of Service	2,920	3,133	(213)
Laundry	150	164	(14)
Utilities, Transportation, Maintenance	4,027	3,884	143
Supplies and Other	4,932	4,361	571
Total Gross Costs	44,462	47,120	(2,658)
Less: Revenue	671	759	88
Expense Credits	8,259	9,756	1,497
Net Cost of Operation	$35,532	$36,605	$ 1,073

HEALTH & SAFETY SECTION

MARCH 1956

Industrial Medical Services (Continued)	February	March	Year to Date
Physical Examinations			
Operations			
Pre-employment	67	57	183
Rehire	12	4	26
Annual	365	454	1108
Interim	95	91	214
A.E.C.	27	27	86
Re-examination and recheck	115	123	353
Termination	72	86	228
Sub-total	753	842	2198
Contractors			
Annuals	1	4	6
Pre-employment	66	82	150
Recheck	28	28	65
Termination and Transfer	73	84	207
Interim	85	129	254
Sub-total	253	327	682
Total Physical Examinations	1006	1169	2880
Laboratory Examinations-Clinical			
Operations			
Government	129	115	379
Pre-employment, Termination, Transfer	747	724	2256
Annual	2003	2414	6036
Recheck (Area)	525	507	1163
First Aid	22	28	84
Sub-total	3426	3788	9918
Contractors			
Pre-employment, Termination, Transfer	1036	1394	3647
Total Clinical Laboratory Examinations	4462	5182	13565
X-Ray			
Operations			
Government	15	6	32
Pre-employment, Termination, Transfer	91	75	248
Annual and interim	514	630	1509
First Aid	35	42	122
Sub-total	655	753	1911
Contractors			
Pre-employment, Termination, Transfer	136	183	475
First Aid	4	11	21
Sub-total	140	194	496
Total X-Ray	795	947	2407
Electrocardiographs	129	188	422
Physical Therapy Cases Referred	67	75	223

HEALTH & SAFETY SECTION

MARCH 1956

Industrial Medical Services (Continued)	February	March	Year to Date
First Aid Treatments			
Operations			
New Occupational Cases	419	467	1370
Occupational Case Retreatments	1632	1625	4989
Non-occupational Treatments	3338	4078	10605
Sub-total	5389	6170	16964
Construction			
New Occupational Cases	24	29	78
Occupational Case Retreatments	68	76	234
Non-occupational Treatments	11	20	58
Sub-total	103	125	370
Total First Aid Treatments	5492	6295	17334
Disabling Injuries			
General Electric	1	0	4
Contractors	0	0	0
Total	1	0	4

HEALTH & SAFETY SECTION

MARCH 1956

Kadlec Hospital

The average daily adult census decreased from 70.9 to 60.7 as compared with 60.1 a year ago. This represents an occupancy percentage of 55.7 broken down as follows: Mixed Service (Medical, Surgical, Pediatrics) 60.9; Obstetrical Service 34.3. A further breakdown of the Mixed Services shows an occupancy percentage of 67.8 on Medical, 64.0 on Surgical and 41.6 on Pediatrics.

The maximum and minimum daily census ranged as follows:

	Minimum	Maximum
Mixed Service	37	60
Obstetrical Service	3	11
Total Adult	45	72

The average daily newborn census decreased from 9.9 to 8.8 as compared with 9.5 a year ago.

Nursing hours per patient day:

Medical, Surgical, Pediatrics	3.39
Obstetrical	4.43
Newborn	3.98

Nursing hours in March increased as a result of an approximately 14% decrease in the patient census from February.

The ratio of hospital in-patient employees to patients (excluding newborn) for the month of February was 1.71. When newborn are included the ratio is 1.50.

The net expense for the operation of Kadlec Hospital for February was $4,598 as compared with $16,557 for January. Summary is as follows:

Kadlec Hospital net expense $4,598

This represents a decrease of $11,959 from January due primarily to increased revenue from a higher patient census and a decrease in total salary expense. Revenue increased $9,335, gross costs decreased $1,944 and expense credits increased $680 due to hospitalized industrial cases. This represents the lowest net operating cost incurred by the hospital since May of 1950 when the clinic physicians went into private practice.

The new board of trustees has been selected for the hospital when it is transferred to the National Board of Methodist Hospitals and Homes and Dr. Horace Turner has been named as administrator. He has visited the hospital several times during the month assembling information for use in making the transition and for future operation.

HEALTH & SAFETY SECTION

MARCH 1956

Kadlec Hospital (Continued)

On March 22 a meeting was held for the hospital employees at which Dr. Turner, Rev. Uphoff, Mr. Carrico and Dr. Norwood informed the employees of the proposed transition and the tentative date which would not be prior to September 1, but should occur during the month of September.

It was also stated by Dr. Turner that the Methodists would want to make as little change in personnel practices and general operations as good business practice would allow under the new management; however, he made it clear that no commitments of any kind could be made to anyone at this time.

Mr. O. E. Bakko terminated March 30 to go to his new position with the Alameda County Hospital System. Effective April 1, 1956, E. J. Quigley succeeds Mr. Bakko as Administrator, Kadlec Hospital.

The summary of employee relations meetings for the Health and Safety Section follows:

	Meetings	Attendance
Hospital	35	239
Industrial Medicine	6	42
Public Health	10	54
Safety & Fire Prevention	1	11
General	2	15
Total	54	361

Hospital Unit (Continued)	February	March	Year to Date
Kadlec Hospital			
Average Daily Adult Census	70.9	60.7	61.5
Medical	23.4	25.1	22.0
Surgical	24.6	20.5	21.8
Pediatrics	12.7	7.9	9.9
Mixed	60.7	53.6	53.7
Obstetrical	10.2	7.2	7.8
Average Daily Newborn Census	9.9	8.8	8.4
Maximum Daily Census:			
Mixed Services	72	60	72
Obstetrical	16	11	16
Total Adult Census	83	72	83
Minimum Daily Census:			
Mixed Services	47	37	26
Obstetrical Service	7	3	2
Total Adult Census	54	45	29
Admissions: Adult	421	376	1163
Discharges: Adult	417	395	1149
Medical	95	113	286
Surgical	182	165	497
Pediatrics	74	60	198
Mixed	351	338	981
Obstetrical	66	57	168
Newborn	62	55	159
Patient Days: Adult	2055	1882	5607
Medical	680	777	2006
Surgical	713	635	1984
Pediatrics	367	247	903
Mixed	1760	1659	4893
Obstetrical	295	223	714
Newborn	288	274	762
Average Length of Stay: Adults	3.5	4.8	4.9
Medical	7.2	6.9	7.0
Surgical	3.9	3.8	4.0
Pediatrics	5.0	4.1	4.7
Mixed	5.0	4.9	5.0
Obstetrical	4.5	3.9	4.3
Newborn	4.6	5.0	4.8
Occupancy Percentage: Adults	65.0	55.7	56.4
Medical	63.2	67.8	59.5
Surgical	76.9	64.0	68.1
Pediatrics	61.6	41.6	52.1
Mixed	69.0	60.9	61.0
Obstetrical	48.6	34.3	37.1
Newborn	38.1	33.8	32.3

(Occupancy Percentage based on 109 adult beds and 26 bassinets.)

HEALTH & SAFETY SECTION

MARCH 1956

Hospital Unit (Continued)	February	March	Year to Date
Avg. Nursing Hours per Patient Day:			
Medical, Surgical, Pediatrics	2.83	3.39	
Obstetrics	3.62	4.43	
Newborn	3.56	3.98	
Avg. No. Employees per Patient (excluding newborn)	1.71		
Operations: Major	60	46	163
Minor	56	48	143
E.E.N.T.	69	59	189
Dental	1	0	3
Births: Live	62	55	164
Still	0	1	1
Deaths	5	3	10
Hospital Net Death Rate	.21%	.22%	.15%
Net Autopsy Rate	20.0	66.6	40.0
Discharged against advice	0	1	1
One Day Cases	97	88	262
Admission Sources:			
Richland	85.7	83.0	84.5
North Richland	0	0	.3
Other	14.3	17.0	15.2
Admissions by Employment:			
General Electric	81.5	81.4	80.2
Government	5.2	2.1	3.5
Facility	5.5	4.0	6.0
Contractors	1.4	3.5	2.5
Schools	.2	1.3	1.1
Others	6.2	7.7	6.7
Hospital Outpatients:			
First Aid	395	439	1267
Clinical Laboratory	165	156	450
Bacteriological Laboratory	88	51	211
X-Ray	105	116	337
Physical Therapy	299	276	779
Physical Therapy Treatments			
Outpatient Treatments	439	613	813
Inpatient Treatments	174	97	346
Total	613	710	1159
Pharmacy			
No. of Prescriptions Filled	2543	2799	7711
No. of Store Orders Filled	533	502	1529

HEALTH & SAFETY SECTION

MARCH 1956

Hospital Unit (Continued)	February	March	Year to Date
Kadlec Hospital (Continued)			
Clinical Laboratory Examinations			
Outpatient Examinations	522	477	1497
Hospital	3247	3153	9394
Total	3769	3630	10891
X-Ray Examinations			
Outpatient Examinations	87	114	299
Hospital	247	194	629
Public Health	20	18	67
Total	354	326	995
Electrocardiographs			
Outpatient Examinations	0	1	1
Hospital	24	51	114
Total	24	52	115
Bacteriological Laboratory			
Treated Water Samples	170	155	534
Milk Samples (Inc.Cream & Ice Cream)	40	36	112
Other Bacteriological Tests	503	464	1275
Total	713	655	1921
Patient Meals			
Regulars	3018	2590	7837
Children under 8	815	630	2188
Specials	989	1297	3040
Softs	535	593	1702
Tonsil and Adenoid	111	127	341
Liquids	141	92	386
Surgical Liquids	81	73	210
Total	5690	5402	15704
Cafeteria Meals			
Noon	1424	1352	4187
Night	248	244	751
Total	1672	1596	4938

HEALTH & SAFETY SECTION

MARCH 1956

Public Health Unit

Communicable diseases reported remained even with last month. Significant changes were noted in measles which increased from 8 to 50, and whooping cough which dropped from 58 to 7.

In order to check the threatened rise in measles cases gamma globulin is being used, primarily to modify the attack in exposed infants. This protection was given to 76 youngsters at the request of their physicians.

A 12% increase in field nursing visits resulted primarily from an increase in communicable disease visits from 94 to 127.

Clinics were held for hearing and tuberculosis. Dr. H. L. Cahn examined 12 youngsters at the hearing clinic and recommended further care. Dr. A. R. Allen examined 13 patients, hospitalized 1 for further study and reviewed the x-rays of 39 others.

Immunizations were completed in the elementary schools. Smallpox vaccinations were given to 1071 children; 949 diphtheria inoculations were done; 67 shots of diphtheria-tetanus, and 83 of tetanus were given.

The nurse supervisor attended a two-day meeting of Public Health Nurse Supervisors in Seattle.

Mental health films were previewed with community groups with the purpose of screening them for use during Mental Health Week and as program material for next fall.

During March the social service counselors began work with 21 new families or individuals. Service was completed with 16 families, and 73 families continued to receive service into April.

Of the new families applying for service, nearly one-half were referred through the schools for help with regard to the behavior or school performance of children of various ages. The three counselors held a total of 263 interviews, and 116 of these were held with parents concerned about difficulties of their children. Personal adjustment problems accounted for 111 interviews ranging through such problems as economic need, vocational adjustment, social relationships and emotional difficulties. In 30 interviews the main focus was on troubled marriage relationships. Very often as a married couple is able to work out mutual problems in marriage, there will be a spontaneous improvement in the adjustment of the children in the family.

An increasing demand for counseling help on family and children's problems is noted. The number of cases carried has nearly doubled since the first of the year.

Public Health Unit (Continued)

During the month four new food establishments started operations - they include two restaurants, a sandwich bar at a local drive-in theater, and a combination sandwich bar and ice cream service. All were approved prior to opening. Regular monthly inspections were made of all other food handling establishments.

The Pennywise Drug Store, due to the recent fire there, had all its food and food supplement items confiscated by the State Agriculture Department. These foods were correctly disposed of under the supervision of the unit's sanitarian.

In the monthly analysis of local milk supplies, the results of fifteen samples from four companies showed three positive coliform counts. Two of the samples were of whipping cream and other coffee cream. Second samples of these three products were immediately obtained for analysis and were found satisfactory.

Dog bites in the community have greatly increased in the past month, averaging one every two days. The overall dog problem is being given careful consideration at this time.

Dr. David B. Rowlett joined the staff as health officer. He will serve the office part-time continuing with his duties in industrial medicine.

D. F. McCarthy replaced G. R. Yesberger as sanitarian.

HEALTH & SAFETY SECTION

MARCH 1956

Public Health (Continued)	February	March	Year to Date
Education			
Pamphlets distributed	10,009	11,289	31,288
News Releases	9	12	33
Staff Meetings	1	5	7
Classes	33	9	71
Attendance	981	143	1,357
Lectures & Talks	8	8	30
Attendance	139	244	2,139
Films Shown	5	21	37
Attendance	135	875	1,361
Community Conferences & Meetings	9	22	43
Radio Broadcasts	3	4	16
TV Broadcasts	5	8	18
Immunizations			
Diphtheria	0	71	71
Diphtheria Booster	508	397	945
Smallpox	600	401	1,071
Tetanus	0	150	150
Tuberculin Test	70	18	141
Immune Globulin	25	76	105
Social Service			
Cases carried over	46	68	155
Cases admitted	36	21	71
Cases closed	14	16	39
Remaining case load	68	73	187
Activities:			
Home Visits	7	5	17
Office Interviews	235	258	667
Conferences	76	56	190
Meetings	53	44	150
Sanitation			
Inspections made	54	54	158
Conferences held	17	38	76

HEALTH & SAFETY SECTION

MARCH 1956

Public Health (Continued)	February	March	Year to Date
Communicable Diseases			
Chickenpox	35	30	88
German Measles	14	22	44
Impetigo	2	0	3
Measles	8	50	51
Mumps	10	10	42
Pinkeye	0	1	1
Ringworm	1	0	2
Roseola	4	2	8
Scarlet Fever	7	14	27
Strep. Infection (Throat)	2	6	10
Thrush	0	1	2
Tuberculosis	1	0	2
Whooping Cough	58	7	80
Total	143	143	370
Total No. Nursing Field Visits	316	353	1,011
Total No. Nursing Office Visits	17	21	42

COMMUNITY SECTION

MARCH 1956

ORGANIZATION AND PERSONNEL:

	BEGINNING OF MONTH		END OF MONTH	
	EXEMPT	NONEXEMPT	EXEMPT	NONEXEMPT
Community Administration	1	1	1	1
Maintenance & Renovations Unit	9	134	7	133
Police Unit	15	25	14	25
Commercial & Residential Property Unit	6	22	5	22
Fire Unit (Includes 33 Firemen)	50	0	50	0
Transfer Study	1	0	1	1
Community Operations Administration	1	1	0	0
Electrical Unit	5	16	5	16
Engineering Unit	5	4	4	4
Water & Sewerage Utilities Unit	6	22	6	23
Library Unit	4*	10**	4*	10**
Public Works & Recreation Unit	6	33	6	39
	109	268	103	274

	Exempt	Nonexempt
Additions to Payroll		11
Transfers In		5
Removals from Payroll	1	3
Transfers Out	6	6

Net Decrease 0

*Includes one half-time employee.
**Includes two half-time employees.

MAINTENANCE AND RENOVATION UNIT

March, 1956

		Exempt	Nonexempt
Employees -	Beginning of month	9	134
	New hires	0	1
	Return from illness leave	0	1
	Transfers in	1	0
	Transfers out	3	3
Employees -	End of month	7	133

INTERIOR PAINT REPORT - FY 1956

March, 1956

FOREMEN: D. W. LUKINS and M. E. TAPPAN

TYPE UNIT	NO. UNITS SCHEDULED	COMPLETED THIS MONTH	COMPLETED TO DATE	BALANCE TO BE PAINTED
A	406	67	219	187
B	352	25	181	171
C	160	6	153	7
D	2	0	1	1
E	23	0	9	14
F	65	0	25	40
G	5	0	2	3
H	68	0	27	41
K	57	2	55	2
L	38	14	25	13
M	7	0	0	7
Q	28	0	4	24
R	24	0	6	18
S	5	0	0	5
T	0			
U	77	3	5	72
V	185	4	28	157
Y	18	1	17	1
Z	2	[illegible]	1	1
1BP	9	[illegible]	7	2
2BP	34	5	34	0
3BP	12	0	11	1
Tract	19	1	3	16
1BR Apt.	27	0	4	23
2BR Apt.	69	40	60	9
W-13 Apt.	5	0	3	2
TOTAL	1697	168	880	817

Units added: 4

Est. MH B. F.	37,660	Actual MH B. F.	38,841
Est. MH This Month	9,405	Actual MH This Month	9,560
Total Est. MH	47,065	Total Actual MH	48,401

182½ manhours were expended on partial paint jobs in houses being renovated.

PLUMBING SHOP

March, 1956

FOREMAN: F. L. ELSENSOHN

Electric water heaters replaced	28
Laundry trays replaced	28
Miscellaneous plumbing work orders completed	23
Miscellaneous steam work orders completed	23
Plumbing for floor and sink linoleum	120
Plumbing for shower stalls replaced	7
Radiators completely overhauled in dorms. & hospital	4
Cleared major sewer stoppages caused by tree roots	80
Cleared major sewer stoppages for Public Works	3
Dug out leaking water and sewer lines for Public Works	7
Plumbing and steam repairs in hospital & Public Health Bldgs.	81.7 hrs.
Worked on plumbing service orders	116.4 hrs.
Loaned Heavy Equipment Operator to Public Works	53.0 hrs.
Hauled salvage material to North Richland	78.5 hrs.
Dug ditch at Village Theater for 700 Area Maintenance	55.0 hrs.

Made routine steam inspection once each week in Government owned commercial facilities, dormitories, and apartments.

Excavated with backhoe machine and handwork for the cleanout of roots in sewer lines, and to repair all leaking and broken underground piping, and backfilled. Landscaped excavated portions.

SERVICE ORDER CREW

FOREMAN: L. F. CARPENTER

A.	Service orders on hand at beginning of month	1529
B.	Received during the month	2313
C.	Completed during the month	2681
D.	On hand at end of the month	1161

E. A total of 119 manhours were expended on work orders.

F. Backlog of service orders by craft:

Plumbing	680
Electrical	406
Carpentry	75
Total	1161

RENOVATION AND LABOR CREW AND MECHANICAL SHOP

FOREMAN: Z. H. MAYBERRY

Houses renovated	30
Minor carpenter repairs to renovated houses	24
Trash pickups	20
Minor repairs to dormitories	16
Houses sprayed for insect control	2
Dormitories sprayed for insect control	3

Provided weekly service of delivering linens and janitorial supplies to occupied dormitories.

Provided weekly pickup and delivery of laundry from various General Electric Company units to Richland Laundry & Dry Cleaners.

A. Millwright Crew:

Furnace service orders	261
Routine furnace inspections	210

All air conditioners at the hospital and clinic have been repadded and serviced for summer operation.

Provided routine maintenance for the hospital.

B. Sheetmetal Crew:

Shower stalls replaced	8
Coal hatch flashings replaced	22
Gutters and flashings replaced	67
Smoke pipes replaced	17
Cooler pad holders repaired	14

Fire truck alterations completed.

C. Service Crew:

Tree removal orders completed	67
Delivered topsoil	5
Tree stumps removed for Electrical Distribution	34

LINOLEUM AND CARPENTER SHOP

FOREMAN: R. M. MARTIN

Replaced bath wall tile	11
Repaired bath wall tile	5
Replaced bath floor linoleum	17
Repaired bath floor linoleum	8
Replaced kitchen floor linoleum	34
Repaired kitchen floor linoleum	8
Replaced bedroom floor linoleum	1
Repaired bedroom floor linoleum	1
Repaired utility floor linoleum	1
Replaced living room floor linoleum	1
Repaired living room floor linoleum	4
Replaced hall linoleum	1
Replaced steps and landing linoleum	22
Replaced sink top linoleum	102
Repaired sink top linoleum	1
Replaced work bench linoleum	7
Replaced sinks	26
Chempoints	149
Paint touchups	94
Installed sill caps	9
Interior carpentry orders completed	106
Repaired roofs	189
Repaired walls	10
Repaired ceilings	3
Replaced ranch window screens	17
Replaced floor boards	3
Repaired basement stairs	2
Repaired porches	4
Jack and shim	7
Replaced thresholds	2
Raised slabs	1
Repaired exterior doors	8
Repaired interior doors	3
Repaired siding	19
Repaired screen doors	2
Replaced prefab window screens	1
Placed sidewalk forms	2
Repaired sidewalk	1
Replaced sash balances	16

COMMUNITY SECTION
RICHLAND POLICE DEPARTMENT
MONTHLY REPORT
MARCH 1956

ORGANIZATION

	EXEMPT	NON-EXEMPT
EMPLOYEES - BEGINNING OF MONTH	15	25
TRANSFERS IN	0	0
TRANSFERS OUT	1	0
NEW HIRES	0	0
TERMINATIONS	0	0
TOTAL - END OF MONTH	14	25

GENERAL

A POLICE LIEUTENANT WAS TRANSFERRED MARCH 1 TO FILL A LIEUTENANT'S VACANCY IN THE SECURITY PATROL. A POLICE SERGEANT WAS PROMOTED TO THE RANK OF LIEUTENANT TO REPLACE HIM. A REQUISITION HAS BEEN PLACED WITH EMPLOYMENT TO PROCURE A PATROLMAN TO MAINTAIN OUR NORMAL FORCE OF 40 EMPLOYEES IN THE POLICE DEPARTMENT.

FIRE DESTROYED THE PENNYWISE DRUG STORE AT THAYER AND WILLIAMS ON MARCH 19, 1956. DAMAGE WAS ESTIMATED AT AROUND $70,000.00. A THOROUGH INVESTIGATION WAS CONDUCTED BY OFFICERS OF THIS DEPARTMENT WORKING IN CONJUNCTION WITH OFFICERS OF THE FIRE DEPARTMENT TO DETERMINE THE CAUSE OF THE FIRE. ON MARCH 27, AN 8-YEAR-OLD BOY WAS INTERROGATED AND ADMITTED SETTING THE FIRE IN THE REFUSE BOX AT THE SOUTH END OF THE DRUG STORE BUILDING. WHILE HE ADMITTED SETTING THE FIRE, HE DID NOT ADMIT DOING SO DELIBERATELY. HOWEVER, IT WAS LEARNED THAT HE HAD SET TWO OTHER MINOR FIRES PREVIOUSLY. THE CASE HAS BEEN REFERRED TO JUVENILE AUTHORITIES FOR ANY POSSIBLE JUVENILE ACTION, AND THE REPORT WAS SUBMITTED TO THE F. B. I., INASMUCH AS THE BUILDING WAS GOVERNMENT OWNED.

ON MARCH 19, DETECTIVE L. M. LINKOUS SPOKE AT COLUMBIA HIGH SCHOOL ON THE SUBJECT "JUVENILE DELINQUENCY".

DURING THE MONTH, 3 CUB SCOUT GROUPS, 1 BLUEBIRD GROUP, AND 3 BROWNIE SCOUT GROUPS WERE ESCORTED ON TOURS OF POLICE HEADQUARTERS.

MEMBERS OF THE TRAFFIC CONTROL GROUP CONDUCTED 4 SAFETY MEETINGS DURING THE MONTH.

TRAFFIC

RICHLAND	1956 Feb.	1956 Mar.	1955 Feb.	1955 Mar.	1956 Total To Date	1955 Total Same Period
Reportable accidents	49	18	17	14	108	65
Property damage accidents	46	16	14	14	100	58
Injury accidents	3	2	3	0	8	7
Total persons injured	3	3	3	0	9	9
Fatal accidents	0	0	0	0	0	0
Accidents-daylight hours	35	16	12	11	80	40
darkness "	14	2	5	3	28	25
Accidents-business district	13	5	3	3	28	11
residential "	33	12	10	8	74	44
other	3	1	4	3	6	10
Accidents investigated	30	12	10	8	68	39
Criminal complaints filed	15	7	5	5	35	15
Violations contributing to accidents:						
Negligent driving	7	8	2	1	17	5
Fail. to yield right of way	11	6	4	1	30	13
Following too closely	8	2	1	4	14	8
Drunk driving	1	0	1	0	2	2
Pedestrian violation	0	1	1	0	1	1
Inattention to driving	0	1	0	2	1	2
Reckless driving	0	0	0	0	0	0
Speeding	0	0	0	0	0	1
Unsafe speed	22	0	4	0	38	18
Improper backing	0	0	2	0	0	5
Improper parking	0	0	0	0	0	0
Disregarding stop sign	0	0	0	2	0	2
Hit and run	0	0	0	0	0	1
Improper passing	1	0	0	1	2	1
Improper turn	1	0	1	1	2	3
Failure to signal	0	0	0	1	0	1
Defective equipment	1	0	0	0	1	0
Wrong side of road	0	0	1	0	0	1
Animal in road	0	0	0	1	0	1

RICHLAND	1956 Feb.	1956 Mar.	Ave. per accident 1956 Feb.	Ave. per accident 1956 Mar.	Ave. per accident 1955 Feb.	Ave. per accident 1955 Mar.
Accident property damage	$9,996.00	$3,852.07	$204.00	$214.00	$346.36	$143.93

TRAINING

ADVANCE TRAINING FOR RICHLAND POLICE MEMBERS AT THE SMALL ARMS RANGE FOR THE PERIOD IN FIELD INSTRUCTION WAS AS FOLLOWS:

RIOT GUN & MACHINE GUN	½ HOUR
TOTAL NUMBER OF MEN REPORTING AT RANGE	7
TOTAL MEN FIRED OVER THE ARMY-L COURSE	7

THESE MEN FIRED FOR PRACTICE AND NO SCORES WERE TAKEN. (RIOT GUN & MACHINE GUN)

ACTIVITIES	JANUARY	FEBRUARY	MARCH
BANK ESCORTS AND DETAILS	4	0	0
BIKES IMPOUNDED	3	0	2
BIKES REGISTERED	28	9	22
CHILDREN LOST OR FOUND	17	7	26
COMPLAINTS INVESTIGATED	98	81	95
DEATHS REPORTED	0	0	0
DOG, CAT, LOOSE STOCK COMPLAINTS	4	8	14
DOGS, OTHER ANIMALS, RPTD LOST OR FOUND	21	10	9
DOORS, WINDOWS, RPTD OPEN IN FACILITIES	29	45	71
EMERGENCY MESSAGES DELIVERED	10	6	4
FIRES INVESTIGATED	8	7	24
GUNS REGISTERED	12	16	12
LAW ENFORCEMENT AGENCIES ASSISTED	7	7	6
LETTERS OF INQUIRY	99	108	111
MISCELLANEOUS ESCORTS AND DETAILS	8	3	7
PERSONS INJURED BY DOGS	0	0	3
PLANT DEPARTMENTS ASSISTED	36	44	28
PRISONERS PROCESSED THROUGH JAIL	8	6	13
PRIVATE INDIVIDUALS ASSISTED	25	19	23
PROPERTY LOST OR FOUND	8	14	13
RECORDS INQUIRIES	25	22	33
REPORTS PROCESSED THROUGH RECORDS	221	238	202
STREET LIGHTS OUT RPTD TO ELECTRICAL	214	229	166
TRAFFIC SAFETY MEETINGS (MAR. ATTEND. 446)	14	6	9
TOTALS	899	885	884

MONTHLY REPORT
RICHLAND POLICE DEPARTMENT
MARCH 1956

OFFENSES	KNOWN	UNFOUNDED	CLEARED OTHER*	CLEARED ARREST
PART I				
1. Criminal Homicide	-	-	-	-
a. Murder & Non. Neg. Mans.	-	-	-	-
b. Mans. by Negligence	-	-	-	-
2. Rape	-	-	-	-
3. Robbery	-	-	-	-
4. Aggravated Assault	-	-	-	-
5. Burg-Break. & Entry	-	-	-	-
6. Larceny Over $50.00	3	-	1	-
Under $50.00	29	-	9	3
7. Auto Theft	-	-	-	-
TOTAL PART I CASES	32	-	10	3
PART II				
8. Other Assaults	-	-	-	-
9. Forgery & Counterfeit	-	-	-	-
10. Embezzlement & Fraud	4	-	-	3**
11. Stolen Prop:Buy:Receive	-	-	-	-
12. Weapons:Carry:Possessing	-	-	-	-
13. Prostitution	-	-	-	-
14. Sex Offenses	-	-	-	-
15. Offenses Ag. Fam. & Child	-	-	-	-
16. Narcotics	-	-	-	-
17. Liquor Laws	-	-	-	-
18. Drunkenness	5	-	-	5
19. Disorderly Conduct	3	-	1	2
20. Vagrancy	-	-	-	-
21. Gambling	-	-	-	-
22. Drunk Driving	1	-	-	1
23. Viol. Road & Driving Laws:				
Failure to Stop & Identify	2	-	-	1
Speeding	24	-	13	11
Stop Sign	22	-	6	16
Negligent Driving	15	-	1	14
Right of Way	1	-	-	1
Reckless Driving	7	-	-	7

OFFENSES	KNOWN	UNFOUNDED	CLEARED OTHER*	CLEARED ARREST
Defective Equipment	14	-	12	2
Illegal Passing	-	-	-	-
24. Parking	23	-	14	9
25. All Other Traffic Violations	24	-	9	15
26. All Other Offenses:				
Public Nuisance	6	-	1	5
Juvenile Delinquency	3	-	2	1
Malicious Mischief	9	-	6	1
Vandalism	4	1	1	-
Lewdness	2	-	-	2
Fire	1	-	-	1
Prowlers	3	-	2	-
Dog Poisoning	2	-	-	-
Investigation for Outside Agency	1	-	-	1
Obscene Telephone Calls	1	-	-	-
Bunco	1	-	-	-
Molesting	1	-	-	-
27. Suspicion	-	-	-	-
TOTAL PART II CASES	179	1	68	98
PART III				
28. Missing Persons	4	-	4	-
Lost Persons	22	-	22	-
Lost Animals	6	-	-	-
Lost Property	11	-	8	-
29. Found Persons	-	-	-	-
Found Property	28	-	25	-
Found Animals	3	-	-	-
TOTAL PART III CASES	74	-	59	-

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.	15	-	-	-
33. Other Traffic Accidents	-	-	-	-
34. Public Accidents)				
35. Home Accidents)	No Accurate Statistics Kept			
36. Occupational Accidents)				
37. Firearms Accidents	-	-	-	-
38. Dog Bites	-	-	-	-
39. Suicides	1	-	-	-
40. Suicide Attempts	-	-	-	-
41. Sud. Death & Bod. Found	-	-	-	-
42. Sick Cared For	-	-	-	-
43. Mental Cases	2	-	-	-
TOTAL PART IV CASES	21	-	-	-
COMPOSITE TOTALS				
PART I,II,III,IV CASES	306	1	137	101

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. ** One Larceny by Check cleared arrest for previous month.

Property reported stolen	Richland	$1,285.26
Property recovered	Richland	$ 885.76

MONTHLY REPORT RICHLAND POLICE DEPARTMENT JUVENILES INVOLVED MARCH 1956

OFFENSES	NO. CASES	JUVENILES	SEX	7	8	10	11	12	13	14	15	16	17
Mischief	5	13	M	2	1	5	2	1	2	-	-	-	-
Larceny	7	8	F	-	-	-	-	1	3	1	1	2	-
		4	M	-	-	-	-	-	2	-	-	2	-
Disorderly Conduct	1	3	M	-	-	-	-	-	-	-	-	-	3
Juvenile Delinquency	3	4	F	-	-	-	-	-	-	2	-	2	-
		5	M	-	-	-	-	-	-	-	1	1	3
Public Nuisance	1	2	M	-	-	-	-	-	-	-	-	-	2
Prowlers	2	3	M	-	-	-	-	-	1	1	-	1	-
Vandalism	1	5	M	-	-	-	-	-	-	1	4	-	-
Fire	1	1	M	-	1	-	-	-	-	-	-	-	-
TOTALS	21	48		2	2	5	2	2	8	5	6	8	8

RICHLAND POLICE DEPARTMENT
RICHLAND JUSTICE COURT CASES
MARCH, 1955

VIOLATIONS	NO. OF CASES	NO. OF CONV.	NO. OF FORF.	CASES CONT.	CASES DISM.	SENT. JAIL	SENT. SUSP.	LIC. REV.	CASES ORIG. PREV. MONTH	BAIL FORF.	FINES	FINES SUSP.	
No Driver's License	9	7	2						1	$10.00	$62.00	$29.00	(4)
No Certificate of Regis	6	6									31.00	5.00	(1)
Defective Equipment	2	2									12.50		
Negligent Driving	13	10	3						2	135.00	360.00	160.00	(9)
Drunk Driving	2	1			1		1	1			52.50		
Reckless Driving	7	6		1				2	2		314.25	65.00	(2)
Speeding	11	7	4						2	40.00	100.00	21.50	(4)
Stop Sign	18	7	9	1	1					75.00	65.00	5.00	(1)
Inattention to Driving	1			1									
Fail. to Yield Rgt of Way	2	2									67.50	15.00	(1)
Driving Without Lights	1	1									12.50	10.00	(1)
Following Too Close	1	1									50.00	25.00	(1)
Illegal Parking	9		6		1					21.00			
Invalid Vehicle License	15	12	2	1						15.00	147.50	60.00	(9)
Malicious Mischief	1	1									7.50		
Malicious Destruc. of Prop.	1	1				1							
Vagrancy	1	1				1							
Public Intoxication	5	1	4							50.00	15.00		
Public Nuisance	7	4	1	2						25.00	87.50	40.00	(3)
Grand Larceny	1			1									
Petit Larceny	1	1									102.50	75.00	(1)
Permitting Vicious Animal to Run at Large	2	1		1					1		25.00		
Totals	116	72	31	8	3	2	1		8	371.00	1512.25	510.50	(37)

1 Reckless Drvg - Posted $250 Appeal Bond.
2 Reckless Drvg - Ammended to Negligent Driving.
1 Reckless Drvg - Drvr's Lic susp 1 year with crt reserving rgt to return lic after 6 months.
1 Reckless Drvg - Lic susp 30 days.
1 Reckless Drvg - Reduced to Negligent Driving

1 Drunk Drvg - Lic susp 30 days, 5 days cnty jail suspended
1 Permitting Vicious Animal to Run at Large - Posted $150 Appeal Bond.
2 Illegal Parking - Did Not Appear.

COMMERCIAL AND RESIDENTIAL PROPERTY UNIT
COMMUNITY SECTION
March, 1956

PERSONNEL - COMMERCIAL AND RESIDENTIAL PROPERTY UNIT:

	Exempt	Non-Exempt
Employees - beginning of month	6	22
Transfers In	0	0
Transfers Out	1	0
New Hires	0	0
Terminations	0	0
Employees - end of month	5	22

PERSONNEL - COMMERCIAL AND NONCOMMERCIAL FACILITIES:

	Commercial	Noncommercial	Total
February	1,592	87	1,679
March	1,608	84	1,692
Net Change	+16	-3	+13

SUMMARY OF ROUTINE ITEMS PROCESSED:

	Commercial	Noncommercial	Total
Work Orders	26	1	27
Back Charges	0	0	0
FY Work Orders	346	29	375
FY Back Charges	11	2	13

CONTRACTS AND NEGOTIATIONS:

A. Commercial

1. Lease

J. R. Parcell - to provide for the construction and operation of a fuel oil distributorship and bulk plant.

2. Supplemental Agreements

a. Amusement Enterprises - to provide for a new use of premises and new payments.

b. Midstate Amusement Corporation - to provide for a new rental structure for the Village Theatre.

BUSINESS DEVELOPMENT:

Invitations to bid were mailed to 24 prospective Lessees in connection with leasing space in the Government-owned building at 702 George Washington Way.

GENERAL:

A. Commercial

1. C. D. McGuinness started construction of an Automobile Agency and Service Station on Lee Blvd. near Wellsian Way.

2. Clark H. and Elizabeth M. Sanderson subleased space for the operation of a lunch counter in the Parker Hanson building in the Westgate shopping center.

3. Bruno Photo Studio subleased space in the Automatic Laundry Co. building.

4. John C. Knoll subleased space in Densow Drugs for the operation of a fountain lunch and delicatessen.

5. Adams Credit Bureau vacated in the Spencer-Kirkpatrick building and the space was subleased to Vista Radio and TV.

6. R. C. Myers terminated the sublease of L. R. Heaton for the operation of Parkway Pumps.

7. The Government-owned building at 905 George Washington Way, formerly occupied by Robley L. Johnson, has been declared excess.

B. Noncommercial

1. The plot of land at the intersection of McMurray Street and Everest Avenue extended, was sold to the Trinity United Protestant Church on March 16, 1956.

2. The plot of land at the intersection of Wright Avenue and Lee Boulevard, which had been leased to the Westside United Protestant Church, was sold to the church on March 27, 1956.

3. One private boat moorage permit was issued and three were transferred.

4. One pasture permit was cancelled.

COMMERCIAL PROSPECTS:

Inquiries were received during the month concerning the establishment of the following types of enterprises in Richland.

Cigar Store	Brick Yard	Trailer Camp
Cabinet Shop	Paint Store	Lumber Yard
Drive In Restaurant	Electrical Business	TV and Radio
Warehouse Space	Hotel	Ice Cream Store

COMMERCIAL AND RESIDENTIAL PROPERTY UNIT - COMMUNITY SECTION March, 1956

SUMMARY OF OCCUPANCY AND EXPANSION STATUS:

	FEBRUARY	MARCH
A. Commercial		
1. Number of Government-Owned Buildings	41	40
a. Number of Businesses operated by Prime Lessees	*38	38
(1) Number opened	1	0
(2) Number closed	2	0
b. Number of Businesses operated by Sublessees	22	22
(1) Number opened	0	0
(2) Number closed	0	0
Total Businesses in Government-Owned Buildings	*60	60
2. Doctors and Dentists in Private Practice	31	31
3. Number of Privately-Owned Buildings	84	85
a. Number of Businesses operated by Prime Lessees	*52	53
(1) Number opened	0	1
(2) Number closed	0	0
b. Number of Businesses operated by Sublessees	*125	128
(1) Number opened	5	4
(2) Number closed	2	1
Total Businesses in Privately-Owned Buildings	*177	181
4. Privately-Owned Buildings under Construction	7	8
5. Total Number of Businesses in Operation	*237	241
a. Total openings	6	5
b. Total closings	4	1
B. Noncommercial		
1. Government-Owned Buildings		
a. Churches	1	1
b. Clubs and Organizations	5	5
c. Government Agencies	2	2
Total	8	8
2. Privately-Owned Buildings		
a. Completed and in Use	13	13
b. Under Construction	2	2
3. Church Plots and Buildings in Private Ownership	8	10
4. Pasture Land Permits	100	99
5. Private Boat Moorage Permits	62	63

*Revised figure

COMMERCIAL AND RESIDENTIAL PROPERTY UNIT

TENANT RELATIONS

PROGRESS REPORT

	Orders incomplete as of February 29, 1956	Orders issued 2-29 to 3-30	Total orders Incomplete as of March 30, 1956
Service orders	1822	2560	1528
Work orders	1192	710	1352
Service charges		232	

Principal work order loads

	Incomplete as of February 29, 1956	Incomplete as of March 30, 1956
Laundry trays	69	74
Kitchen cabinet linoleum	86	94
Kitchen floor linoleum	65	49
Bath tileboard	30	14
Shower stall	17	22

---

103 alteration permits were issued as compared to 113 issued in February.

Install automatic washer	14	Install automatic dryer	14
Install TV antenna	21	Install electrical heat	3
Convert to oil	1	Basement excavation	1
Install fence	26	Install concrete slab	1
Install patio	3	Sand floors	1
Reverse range & refer	1	Install exhaust fan	1
Install air conditioner	1	Install back door	2
Install gas range	1	Build garage	1
Remove laundry trays	2	Remove partitions	3
Construct shed	2	Install additional wiring	3
Relocate water heater	1		

---

998 inspections were made, as compared to 836 in February.

Alteration permits	200	Basement	1
Bathroom	20	Ceilings	2
Doors	3	Floors	8
Laundry trays	22	Linoleum	118
Lot lines	73	Paint	149
Porch	11	Range & refer recall	9
Steps & walks	7	Sink	19
Shower stall	5	Toilet seat	1
Walls	4	Windows	2
Yard	4	Roof	1
Miscellaneous	6	Dormitories	147
Cancellations	62	Shows (new tenants)	67
Renovations	57		

COMMERCIAL AND RESIDENTIAL PROPERTY UNIT

TENANT RELATIONS

TENANT STORES

Merchandise Issued	Total Amount
Shades	1889
Reflector	50
Ice cube trays	50
Meat tenders	6
Drip trays	13
Hydrator glass	7
Drip pans	8
Cooker pots & lids	3
Refer parts	3
Furnace parts	2
Door stops	24
Furniture delivery	13
Furniture recall	20

RECALL AND DELIVERY OF RANGES AND REFRIGERATORS -- MONTH OF MARCH

	DELIVERY		RECALLED	
	RANGES	REFERS	RANGES	REFERS
A	5 SC	1 TA 1 SO 82-1	3 SC	2 TA
B	3 SC	2 TA SO82-1	3 SC	2 TA
C		1 SO 82		1 SO82
E		1 TA		1 TA
F	1 SC			
H	1 SC		2 SC	
L		1 TA		1 TA
U		1 GE		1 GE
V	2 GE	3 GE		
Y	2 GE	1 GE	1 GE	
2Br.		7 TA	2 SC	3 TA
3Br.	1 SC	1 TA 1 GE	1 SC	
Tract			1 SC	2 TA
Total	15	23	13	13

Excess: AB ranges--7 on March 5, 1956

IN WAREHOUSE:

GE 7' refers---1
TA 7' refers --10
GM 6' refers --2
AB ranges -----34
GE ranges -----6
Frigidaire ranges --1

COMMERCIAL & RESIDENTIAL PROPERTY UNIT
RESIDENTIAL LEASES

MARCH 1956

DORMITORY REPORT

	Beds Available	Vacant Beds	Occupied Beds
Men	399	74	325
Women	305*	65**	240*
Total	704*	139**	565*

*This includes 2 beds used for Dormitory Offices.
**This includes 9 beds vacant in Dormitory M-13.

Waiting list

	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	W 15	50 beds
M 6	39 beds	M 7	39 beds	M 8	39 beds
W 16	50 beds				

TOTAL BEDS 293

Dormitories released for temporary office use:

W 21	50 beds	W 17	50 beds	TOTAL BEDS 100

RESIDENTIAL LEASING

CANCELLATIONS		ALLOCATIONS	
Voluntary terminations	10	New tenants	53
Transfers	4	Moves (within Richland)	19
Retirement	1	Turnovers	5
Move off Project	19	Total	77
Turnovers			
Deaths	2	Houses on which leases were cancelled "Ready to Rent"	37
Divorce	1		
Marriage	1		
New Pastor	1	Houses on which leases were cancelled sent to "Renovation"	18
Move to Wherry House	2		
Military Service	1		
Not Eligible	2	Number persons on Master list	562
Moves (within Richland)	19		
Excessed	2	Number names on Move list	6462
TOTAL	65		

RICHLAND HOUSING

HOUSING UTILIZATION AS OF MONTH ENDING MARCH 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. Employees	2225	268	10	401	889	1128	7	55	59	207	25	5274
Comm. Fac.	98	17		26	46	55		4	3	8	2	259
AEC	65	27		16	33	26	3	3	5	9	2	189
Other Gov't.	11	2			3	2					1	19
Post Office	10				2	8					1	21
Schools	69			6	13	40			2	1		131
Comm. Activities	9			1	6	5				1		22
Med. Facilities	4	16			1	3				3		27
J. A. Jones	3	3			3							9
Minor Const.						1						1
Not Certified	3				3	2		1			1	10
Total	2497	333	10	450	999	1270	10	63	69	229	32	5962
Ready to Rent	1				1	3					1	6
In Renovation	2					3		1	1	1		8
Boarded Up											4	4
Total	2500	333	10	450	1000	1276	10	64	70	230	37	5980

	Begin Month	Moved In	Moved Out	End of Month	Difference
Conventional Type	2490	+18	-11	2497	+7
A&J Type	333	+2	-2	333	0
"T" Type	10	+0	-0	10	0
Precut Type	448	+6	-4	450	+2
Ranch Type	998	+3	-2	999	+1
Prefab Type	1265	+35	-30	1270	+5
Dorm. Apts.	10	+0	-0	10	0
A&J Apts.	63	+1	-1	63	0
2BR Apts.	69	+2	-2	69	0
Fourth Housing	230	+2	-3	229	-1
Tract	34	+0	-2	32	-2
Total	5950	+69	-57	5962	+12

COMMUNITY SECTION
RICHLAND FIRE DEPARTMENT
MONTHLY REPORT

MARCH 1956

ORGANIZATION & PERSONNEL	EXEMPT	NON-EXEMPT
Employees - Beginning of Month	17	33
Transfers In	0	0
Transfers Out	0	0
Terminations	0	0
New Hires	0	0
End of Month	17	33

FIRE PROTECTION

Fire Loss (Estimated):	Government	$125.00*
	Personal	0.00*
	March Total	$125.00*
	1956 Total	682.13*

*Damage estimates not available at report time for the Pennywise Drug Store Fire on March 19.

Response to Fire Alarms	47
Ambulance Response	20
Inside Schools or Drills	30
Outside Drills	7
Safety Meetings	11
Security Meetings	3
Alarm Boxes Tested	217

Eight Cub Scouts and two Adult Leaders toured the Central Fire Station on March 7. On March 28, a Boy Scout was examined for his Firemanship Merit Badge.

Fire apparatus was dispatched four times during the month to stand by at the AEC Airport for Military Air Transport plane landings and take-offs.

Two men were detailed on March 28, to assist with tests of all Kadlec Hospital sprinkler systems

FIRE PROTECTION - continued

The Tank Truck was dispatched on March 30, to stand by during controlled burning adjacent to lumber storage on Wellsian Way

FIRE PREVENTION BUREAU

A total of 169 buildings were inspected, resulting in 11 hazard reports being submitted. A total of 160 fire extinguishers and 18 fire hose standpipes were inspected and serviced; 12 extinguishers were recharged; 2 installed, and 1 removed.

Completed year-round fire prevention report, in book form, and submitted it to the Chamber of Commerce for entry into National Fire Safety Contest, sponsored by the United States Chamber of Commerce in Washington, D. C.

Investigated fire at Pennywise Drug Store, which involved the entire roof and caused major loss. Interviewed a total of 18 witnesses and employees. Later attended two investigating Committee Meetings to compile final report.

Investigated boiler room fire at Uptown Sel-Service Laundry and Dry Cleaners, caused by malfunctioning boiler.

Investigated a fire that appeared to have been set intentionally between walls of restrooms in The Mart. This condition was encountered on a routine inspection and had never been reported. The holes in walls have since been closed with heavy plywood.

Conducted fire extinguisher demonstration for 15 employees of W-10 Building. Lectured to employees of Richland Public Library on Fire Safety. Lectured on "Fire Safety in Construction" to 70 employees of the GE Drafting Section.

Initiated Clean-up Week plans with Chamber of Commerce and arranged evening meeting with appointed committee, where plans and projects were formulated. Clean-up Week was designated as week of April 15 thru April 21. Ordered posters and obtained literature from an Insurance Company to distribute to all Elementary Schools.

Organized new procedure for evacuating 703 Building and lectured to 40 wardens regarding their duties during fire emergencies.

Efforts were made to eliminate serious fire hazards at Westgate Shopping Center caused by the erection of lean-to's for shops and storage purposes.

Caused owners of Westgate buildings to install concrete slabs and crash protection for the two large propane storage and supply tanks.

FIRE PREVENTION BUREAU - continued

Requested new lessee of the former Young World Shop in Uptown to suspend fluorescent light fixtures from the highly combustible ceiling, which he agreed to do.

Followed up on improvements made at the rear of Chief Joseph School to prevent gas from forming in low places in event of leakage from propane tank. Sewers were raised, wells installed around vents of building and 150 yards of fill dirt was placed to drain away gas fumes.

Conducted a survey of vertical and horizontal openings into attics of all government-owned commercial buildings and dormitories.

Supervised time tests made on 7 sprinkler systems in the Kadlec Hospital at the direction of AEC. Those assisting with tests included AEC Engineers and architectural engineer hired by AEC.

COMMUNITY SECTION
RICHLAND ELECTRICAL UNIT
MONTHLY REPORT
MARCH 1956

ORGANIZATION AND PERSONNEL	Exempt	Non-Exempt
Employees Beginning of Month	5	16
Transfers In	1	
New Hires		1
Transfers Out	1	1
Total End of Month	5	16

SYSTEM MAINTENANCE AND OPERATION

Outside Lines	
Poles set	20
Poles transferred	20
Anchors installed	19
Guys installed	23
Street lights installed	0
Mast arms installed	1
Street lights relamped - 1100 Area	168
Street lights relamped - 700 Area	7
Flood lights relamped - 1100 Area	27
Flood lights relamped - 700 Area	6
Stack lights relamped - 700 Area	1
Traffic signals relamped	4
Primary line footage added	0
Primary line footage removed	0
Transformer KVA added	585
Transformer KVA removed	592
New services installed	3
Services removed	5
Scheduled outages	20
Unscheduled outages	5
Trees trimmed	174
Stand by and Escort	3

TRAFFIC SIGNALS

Operational failures	1
Installations	1
Removals	0
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

RICHLAND ELECTRICAL UNIT

UTILITIES - ELECTRICAL MAINTENANCE

Electrical motors checked and serviced - irrigation	3
Electrical motors checked and serviced - water	36
Electrical motors checked and serviced - sewage	60

FIRE DEPARTMENT TEST AND MAINTENANCE

Inside circuit and equipment checks	2
Outside circuit checks	3
Inside faults repaired	1
New circuits placed in operation	0
Outside faults repaired	5
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	0

METERING - OPERATION, MAINTENANCE, CONSUMPTION AND REVENUE

Voltage and load checks	7
Meters tested - customer's requests	2
New meters shop tested	50
Faulty meters replaced or repaired	5
Damaged meters and covers	0
Residential read-ins	152
Residential read-outs	125
Residential disconnects	14
Residential reconnects	13
Radio interference checks	6
Overloaded meters changed out	0
Routine meter tests	168

Consumption and Revenue for Month of February.

	No. of Meters	KWH	Revenue
Residential - Schedule 1	6,967	11,221,134	$99,775.83
Commercial - Schedule 2	419	3,669,465	29,359.80
Total	7,386	14,890,609	$129,135.63

COMMENTS:

TRAFFIC SIGNAL SYSTEM

Traffic light at Stevens & Lee dropped due to failure of supporting steel strand. Light was repaired and placed back in service the same day. Steps have been taken to prevent re-occurrence of this type of failure. Installed traffic light and siren over George Washington Way in front of Central Fire Station and wired so that traffic could be controlled at intersection of Swift & George Washington Way and Swift & Goethals. Repaired crosswalk signal in front of Community House on call-out. Performed routine relamping and preventative maintenance as required.

FIRE PROTECTION SYSTEM

Changed wiring in master fire alarm box at Transportation so that maintenance of this could be performed more efficiently. Located and removed ground on No. 1 fire alarm circuit on hold-over. Repaired break in fire alarm circuit No. 4 on call-out. Performed routine maintenance and tests.

SEWAGE TREATMENT AND DISPOSAL SYSTEM

Performed routine weekly maintenance and servicing of all electrical installations. Disconnected and reconnected two pump motors to allow for servicing of pumps.

GENERAL COMMUNITY MAINTENANCE

Installed wiring and outlet for range at Library building.

WATER SYSTEM

Overhauled 1 pump motor. Check, repaired where necessary, and repacked with grease all irrigation pump motor bearings in preparation for forthcoming irrigation season. Disconnected Well "A" at North Richland well field to repair entrance switch.

SUBSTATION AND METER MAINTENANCE

Performed routine transformer and substation maintenance. Made nine disconnects so as to allow customers to install electric heating. Overhauled three distribution transformers as part of our routine maintenance program.

OUTSIDE LINES

Experienced limited damage due to severe wind storm. Main damage resulted when sign blew over on service to By's Burgers and shorted out service drop. A call-out for By's Burgers was extended to repair broken fire alarm circuit, blown fuse on primary switch 23X62, and arcing hot line clamp. Four other call-outs were made necessary during the month because of trees falling onto service drops at 1204 Swift, 1308 Hunt, 719 Symons, and 310 Benham. Removed service to exit lights at Lutheran Church at request of contractor. Service will not be replaced - new building will provide alternate source of power for the exit lights.

OUTSIDE LINES (Continued)

Checked all Sweitzer-Conrad fuse disconnects for loose contacts and repaired three that were found to have dropped out of fully locked position.
Relocated poles and removed two poles on the south side of the 703 Building to clean up distribution system in that area.
Disconnected electrical service to Pennywise Drug Store while drug store was on fire.
Relocated down guy at Sacajawea School and moved pole in school bus lot at request of Richland School Maintenance.
Removed five kites from wires.
Disconnected three services to tract houses which are to be excessed.
Replaced nine transformers with transformers of a higher capacity in anticipation of conversion of house heating systems to electricity.
Provided three high load escorts.

CALL-OUTS

Fourteen non-exempt and six exempt employees where called out during the month on six cases of trouble.

COMMUNITY SECTION
ENGINEERING UNIT
MONTHLY REPORT
MARCH 1956

PERSONNEL	Exempt	Non-Exempt	Total
Employees Beginning of Month	5	4	9
Transfers Out	1	0	1
Transfers In	0	0	0
Terminations	0	0	0
Total End of Month	4	4	8

BUILDING PERMITS ISSUED

1. H. L. Plummer-705 Adams-Storage Shed
2. Densow Drugs-1011 Wright Ave.-Remodeling & partitioning of restaurant area
3. Charles O. Black, Jr.-1005 Winslow-Private garage
4. Richland Lutheran Church-1528 Stevens Drive-New church building
5. Rice's Rug Service-777 Stevens Drive-Addition on west of building
6. H. D. Heath-1007 Winslow-Private garage
7. Central U.P. Church-1150 Stevens Drive-Building addition to Sunday School building
8. 3 sign permits

NEW MUNICIPAL CONSTRUCTION STARTED

NONE

ENGINEERING JOBS COMPLETED

G-03629 - Replacement of Thin-Wall Steel Water Lines (FY 1955)

C-1846 - Determine Volume of Coal Stock Pile

A-22665- Plat and Legal Description No. 23 - Assembly of God Church

C-11460- Plat and Legal Description, "Christian Science Society"

C-11486- Plat and Legal Description, "Jewish Congregation"

STATUS OF ENGINEERING UNIT PROJECTS

G-03641 - Harris Ave., Gaillard Place & Hains Avenue Extension - Plans to A.E.C. for approval 4-3-56.

G-03652 - Water and Sewer Facilities, Wellsian Way - Plans to A.E.C. for approval 3-26-56.

C-0572 - Study of Drainage Ditch from Swift Blvd. to Origin on Wellsian Way - 80% complete. Design delayed for higher priority work.

C-0588 - Thin-Wall Steel Water Line (FY 1956) - Project being processed.

C-9455 - Retirement of Irrigation Canal - 75% complete. Design delayed for higher priority work.

C-9457 - Retirement of Separate Irrigation System - Drawings and specifications materially complete.

C-11461 -Revise Legal Description of 11 Churches - 95% complete.

C-11489 -Plat and Legal Description, "Bethel Church of Nazarene" - 65% complete.

C-81578 -Basin Located West of No. Richland Recharge Basin - Work contracted and being supervised by A.E.C.

C-81767 -Disposal - Street - Estimate of Cost - Work materially complete. Report forwarded to A.E.C.

C-81944 -Preliminary Studies, Field Surveys, Domestic Water Meters - Preliminary scoping work completed.

C-95450 -Replace Lot Line Corner Stakes - an open active file. Work being performed as requested.

BUILDINGS UNDER CONSTRUCTION

First Baptist Church (Richmond & Raleigh Sts.) - 92% complete. No progress this month.

Plans, Specs., Inspections, Central U. P. Church (Alternate #1) - Work progressing normally.

Plans, Specs., Inspections, L. G. Cook Building - Building materially complete.

Plans, Specs., Inspections, Parker Hansen Building - Work progressing. Partially occupied.

Plans, Specs., Inspections, Moore's Service Station - Work stopped by owner.

Plans, Specs., Inspections, Parcell's Bulk Station, Wellsian Way - 92% complete. Work progressing slowly.

Plans, Specs., Inspections, True's Oil Co. (Old "Rose Garden Site") - Construction 90% complete.

Plans, Specs., Inspections, "The Mixer" - Work completed. Open for business.

COMMUNITY SECTION
PUBLIC WORKS AND RECREATION UNIT
MONTHLY REPORT
MARCH 1956

ORGANIZATION AND PERSONNEL	Exempt	Nonexempt
Employees Beginning of Month	6	33
Transfers Out	0	3
Transfers In	0	5
New Employees	0	5
Terminations	0	1
Total End of Month	6	39

ROADS AND STREETS

All Class C roads were bladed during the month when moisture conditions were optimum, except Jones Road. All debris was removed from the main drainage ditch in town which extends from the By-pass highway to George Washington Way. Clean up of sand and debris from the snow and ice control program during the winter is in progress. Approximately one quarter mile of approach road to the sanitary fill area from the south was regraded and stabilized with base rock to provide an all-weather road for this operation. Approximately 70 cubic yards of topsoil was hauled for repair of parks and playgrounds. Work was also completed on the north boat ramp at Riverside Park.

Street repair work during the month consisted primarily of repair of shoulders on the By-pass highway at intersections, and regrading of street shoulders on the Class B streets. Approximately 300 yards of 3/4" minus rock material was laid in this operation. Blacktop patching has been held to a minimum due to temperatures being below 60°.

A purchase requisition is being prepared by the Transportation Section for replacement of the street sweeper which is now in for a major overhaul. This unit will be out of service for approximately 6 weeks.

SANITATION

Waste removal during the month required collection and disposal of the following:

Residential:	880 tons
Commercial:	234 tons
Trash Wagons:	136 tons
Total	1 250 tons

A spring clean up of private residential yards resulted in a very heavy run of waste at the sanitary fill and required calling out the operator and the foreman, Mr. Phillips, to direct traffic and control the trash disposal.

It was estimated that more than 500 cars unloaded trash on each of the last two Saturdays of the month at the sanitary fill.

PUBLIC WORKS AND RECREATION UNIT

SANITATION (Cont'd.)

Work is continuing on the removal of trash wagons from commercial collection and a total of ten were removed and commercial operator placed on can collection during the month.

PARKS AND PUBLIC GROUNDS

Fertilizing of all park areas for the coming summer season was completed during the month.

The restrooms at Riverside Park and Columbia Playfield were opened and placed back in service on March 27.

Picnicers are now using these areas quite extensively.

All irrigation systems of parks and park ways serviced with domestic water have been turned on and necessary repairs made for the operating season. Water was also turned on in the shelterbelts and irrigation has been started.

All tennis courts have been placed back in service and the repair of all ball fields has been completed.

General clean up of all open areas has been completed and rye seedings of last fall are showing good progress. Clean up was also continued in the parks and playgrounds and some random irrigation has been started at these locations.

MOSQUITO CONTROL

Mosquito control work was started on March 12 for the 1956 season. Due to the early winter, very little burning and clean up was done last fall and this work is in progress at this time.

Due to the anticipated flooding of both the Yakima and Columbia Rivers, all low areas are being burned and cleared as rapidly as possible.

All equipment required for mosquito control has been secured through the Transportation Section. All spray materials are on hand.

RECREATION

General

The Red Cross Blood Bank held its monthly blood drawing at the Community House on March 7.

The annual kite flying tournament was held at Columbia Playfield on Saturday, March 10, with approximately 35 contestants and 50 spectators.

The annual indoor campfire girls exhibit was held in the Community House on March 17 with approximately 325 persons in attendance.

PUBLIC WORKS AND RECREATION UNIT

RECREATION (Cont'd.)

An Easter party for the children under the direction of the Marine Corps Auxiliary was given in the Social Hall on Saturday, March 31.

The fall and winter youth activities program came to a close on March 30 and the spring and summer program is now in progress.

Attendance Statistics - March 1956

	No. of Sessions	Youth	Adults	Sub Total
A. Community House				
AAU Boxing	25	532	119	651
Adult Table Tennis	4		109	109
American Little League	4		52	52
American Red Cross	1		165	165
Arts and Crafts Class	8	47	8	55
Ballroom Dancing	2	37	2	39
Boy Scouts (Membership Program)	1		20	20
Boys of Woodcraft	1	19	17	36
Camera Club	1		10	10
Campfire Girls	3	303	35	538
City Council	2	35	210	245
Colt League	2		25	25
Columbia Basin Coin Club	2	2	28	30
Desert Ski Club, Jr. Chapt.	2	48	13	61
Elementary & Junior Sq. Dancing	5	609	69	678
Elementary Movies	5	626	49	675
Fencing	4		25	25
Games Room	21	1 426	299	1 725
Hi-Spot	9	2 646	46	2 692
Instrument Society of America	1		7	7
International Folk Dancers	3	17	51	68
Junior Sportsmen	2	21	8	29
Laundry Workers Union	1		25	25
Marine Aux. Easter Party	1	125	80	205
National Little League	3		53	53
Orthopedic Guild	2		135	135
Pee Wee Little League	2		24	24
Pony League	2		34	34
100 Area Chief Operators	1		18	18
Public Works & Rec. Safety Meeting	1		36	36
Rec-A-Teers	5		374	374
Richland Chess Club	5		42	42
Richland Jr. Women's Club	2	30	180	210
Richland Merchants	1		10	10
Richland Rod and Gun Club	1	20	130	150
Richland Softball Association	1		25	25
Richland Women's Club	1		40	40

PUBLIC WORKS AND RECREATION UNIT

Attendance Statistics (Cont'd.)

	No. of Sessions	Youth	Adults	Sub Total
Social Security	2		64	64
Stamp Club	1	7	15	22
Tumbling	4	175	27	202
Umpires' Association	5		68	68
Y.W.C.A. Board Meeting	1		8	8
Total Community House	150	6 725	2 955	9 680
B. Parks and Playgrounds				
Wellsian Lake	18	525	180	705
Ball Field Bookings	126	2 120	400	2 520
High School P.E. Classes	15	2 100	270	2 370
Memorial Softball Pony Tryouts	2	150	60	210
Total Parks and Playgrounds	192	7 745	1 210	8 955
C. Summary				
Community House and Parks and Playgrounds total for March 1956	342	14 470	4 165	18 635
Calendar Year to Date				35, 310

COMMUNITY SECTION
WATER AND SEWERAGE UTILITIES UNIT
MONTHLY REPORT
MARCH 1956

ORGANIZATION AND PERSONNEL

	Exempt	Non-Exempt
Employees Beginning of Month	6	23
Transfers Out	2	0
Transfers In	2	0
New Employees	0	0
Terminations	0	0
Total End of Month	6	23

DOMESTIC WATER

Normal operations and routine minor maintenance were continued throughout the month.

The irrigation canal was put in service, running water to the 3000 area recharge basin, on March 7. The canal water was very turbid and normally would not be used for recharge. However, our underground water table was very low and it was necessary to recharge as much as possible prior to shutting the canal down on March 26th, to permit construction work to commence on the sedimentation basin at the 3000 area well field.

Water meters were installed on water service lines at the following locations during the month.

Kaiser's Market	1902 George Washington Way
Richland Tire Exchange	837 Stevens
Anderson Motor's	941 Stevens
Richland Lutheran Church	1528 Stevens
Bailey Building No. 2	1330 - 1332 Jadwin
Richland Heights Baptist Church	390 Thayer Drive
Kennel-Ellis Studio	1367 George Washington Way
Spencer-Kirkpatrick Building	1385 George Washington Way
Economy Furniture	615 Goethals

WATER AND SEWERAGE UTILITIES UNIT

DOMESTIC WATER DATA

	Well Production	Av. Da. Prod.	Total Consumpt.	Av. Da. Cons.
Richland	60,140,000	1,940,000	129,928,600	4,191,200
North Richland	107,050,000	3,453,200	28,706,000	926,000
Columbia Field	58,494,600	1,886,900		
300 Area			67,100,000	2,164,500
Total	225,684,600	7,280,100	225,734,600	7,281,700

Maximum Daily Production 10,672,000 Gallons on March 28, 1956

Maximum Daily Consumption 10,172,000 Gallons on March 28, 1956

SEWERAGE SYSTEM

Normal operations and routine minor maintenance was continued throughout the month.

Some major repairs to the digester mixers, at the Sewerage Treatment Plant, have been made and more are in progress. An inspection of the mixer units was made while endeavoring to determine the cause of digester gas leakage. It was found that on two of the units the seal gland had eroded severely. This made it necessary to remove the units for overhaul.

While the digester mixer units were being removed an inspection of the digester contents revealed a sludge blanket, of approximately eight feet in depth, had formed on the surface of the digester. This blanket material was very dry and solid. It was preventing the expulsion of gas from the normal digestion area. While the mixers were out the blanket was wetted down and the digester liquid level lowered in an effort to submerge the blanket. Digester temperature was increased by using propane gas to operate the furnaces. An inspection on March 29th revealed satisfactory progress in decomposition and digestion of the blanket material. Digester temperature is being increased to 105° F to aid in controlling blanket formation.

Sewerage system flushing program was completed during the month.

SEWERAGE DATA

Plant No. 1 Total Flow	34,530,000	Average Daily Flow	1,113,800
Plant No. 2 Total Flow	66,217,000	Average Daily Flow	2,136,000
Total Flow	100,747,000		4,249,800

IRRIGATION SYSTEMS

The winter frost damage to irrigation pumping stations has been repaired and the stations are ready for service.

Irrigation canal cleaning is about 90 percent completed. It is anticipated that the canal will be ready for service April 9, 1956

COMMUNITY SECTION
RICHLAND PUBLIC LIBRARY
MONTHLY REPORT
MARCH, 1956

ORGANIZATION AND PERSONNEL

	EXEMPT	NON-EXEMPT
Employees beginning of month	4	10
Transfers in	0	0
Transfers out	0	0
New Hires	0	1
Terminations	0	1
End of Month	4	10

GENERAL

Circulation

Books	20,560	
Magazines	520	
Pamphlets	90	
Records	1,309	
Pictures	4	
Inter-Library Loans	56	
Grand Total		22,539

Current Book Stock

Books added this month	333
Books withdrawn this month	92
Grand Total	38,391

Registration

Adult	139	
Juvenile	56	
Juvenile registrations dropped	13	
Net Total	182	
Total Registered borrowers	21,380	
Meetings in North Hall	5	
Children's story hour attendance	1,091	(Pre-school: 798 Elementary: 293)

Three films, "Sinbad the Sailor", "Circus at the Zoo", and "Loose Nut" were shown at the three Easter Story Hours. Films were obtained on a free loan basis from the Standard Oil Company. Candy Easter eggs were presented to the 328 children attending these special story hours. The Easter eggs were furnished by the Richland Chapter of the American

Association of University Women as part of their sponsorship of the children's special activities program.

As a special project the Camp Fire "Bluebirds" made an Easter Egg tree for the library. Sixty Bluebirds came to the library, Saturday, March 31, to decorate the tree with the individual eggs which they had made. One of the Camp Fire girls gave the history of the egg tree custom.

Miss Marie Golubski, Children's Librarian, spoke at the Marcus Whitman - Jason Lee Pre-school P.T.A. meeting Wednesday, March 28, at the Jason Lee School, on the subject of books for pre-school children. The meeting was attended by twelve pre-school mothers.

Mrs. Evelyn Rhoads joined the Richland Library Staff on March 13 as Secretary.

AUXILIARY OPERATIONS AND PLANT PROTECTION SECTION

MONTHLY REPORT - MARCH 1956

ORGANIZATION AND PERSONNEL

Number of employees on payroll:

	Beginning of Month	End of Month	Increase	Decrease
Staff	2	2		
Administration Area Maintenance	105	105 (a)		
Security and Patrol	467	472	5 (b)	
Fire Protection	129	129		
Office Auxiliaries	115	115 (c)		
Telephone	82	82		
TOTALS	900	905	5	0

NET INCREASE: 5

(a) - Administration Area Maintenance

1 - Reactivated
1 - Transferred in
1 - Transferred out
1 - Deactivated

(b) - Security and Patrol

3 - Transferred in
2 - Reactivated

(c) - Office Auxiliaries

6 - New Hires
1 - Reactivated
7 - Transferred out

FIRE PROTECTION UNIT

Fire Responses

HAPO	6	Loss $ 37,000.00
Construction	1	5.00

Description of Fires

Engineering - Separations Technology - Semi-Works Operations
200-E Area, Time 3:38 AM, 3/3/56

Responded to Gamewell box alarm No. 42, 276-C Hot Semi-Works. Heat, built up by building closure, caused sprinkler system to actuate alarm. Reset sprinkler system and alarm. Accidental alarm, no fire.

Manufacturing - Separations - Metal Removal
200-E Area, Time 4:13 AM, 3/5/56

Responded to a telephone alarm from an employee making a routine inspection of building 271-BXR (BX Tank Farm). On arrival found building charged with smoke, visible fire at the southeast corner. Fire was completely out at 4:50 AM with confinement to the immediate area of its origin. Probable cause was breakdown of electrical ground detector unit, causing 13,000 volts to be applied to the 440 volt system. Loss to interior of building $5,000, electrical $23,000, instrument panel and equipment $9,000. Total loss $37,000.

Engineering - Separations Technology - Laboratory Services
300 Area, Time 3:50 PM, 3/6/56

On arrival found a 160 degree detector head, installed near a heating unit at the 340 Building, had fused thereby actuating box alarm No. 16. Detector head was replaced with a 212 degree unit and alarm system reset. No fire.

Engineering - Separations Technology - Laboratory Services
300 Area, Time 1:51 PM, 3/9/56

Discarded smoking material (live cigarette) in a cardboard carton of trash and rags at the 321 Building caused a smoldering fire which was confined to the box and its contents. Reported via phone by an employee. No loss.

Manufacturing - Separations - Mechanical Maintenance
300 Area, Time 2:30 PM, 3/12/56

An employee accidently opened an inspectors test valve of the sprinkler system in the 3717 Building, thereby actuating Gamewell box alarm No. 45. No fire.

Manufacturing - Metal Preparation - Power & Maintenance
300 Area, Time 10:56 AM, 3/28/56

A truck operator accidently backed his equipment into the pole on which Box No. 31 for 3707-D Building is located. The jar actuated the alarm.

AEC -Construction - Hoffman Construction Company
200-W Area, Time 2:43 PM, 3/29/56

Responded to a phone alarm at the 224-U Area, found a discarded pair of coveralls had burned. Caused by sparks from a welders torch. Fire confined to coveralls. Loss $5.00.

Fire Protection Unit (Contin)

Drills Held During March

Outside drills held	104
Inside drills held	137

A Safety Committee comprised of four Firemen and an Officer made their monthly tour of all Fire Stations. Hazards were listed and are being corrected.

Four demonstrations on artificial respiration and instructions concerning shock were held during the month. A total of 120 employees attended these classes.

A Chemox mask demonstration was held at 222-S Building with 30 employees attending.

Nine members of 100-H Patrol were instructed in the use of fire extinguishers.

There were 57,170 feet of fire hose and 747 feet of ladders used for drill purposes during March.

Fire Extinguishers

Inspected	1641
Installed	13
Delivered to new locations	15
Seals broken	26
Serviced	227
Weighed	302

Gas Masks

Inspected	42
Serviced	4
Hand Lines Inspected	132
Hose Boxes Inspected	24
Sprinkler Systems Inspected	5

OFFICE AUXILIARIES SUB-SECTION

Plant Mail Unit

Internal mail decreased slightly during the past period, but outgoing postal (all types) rose sharply for the second month. The incoming postal mail decreased slightly.

Special assignments included preparation and mailing of the Organization Directory, plus sixty-two separate mailings of addressographed work and one mailing for Community of election information to all the homes in Richland.

A time study is in progress of all the mail schedules and a few minor changes have been made in the outer areas as needed for more efficient coverage. The study will continue and spot checks will be made for certain dates of the month where known work loads are heavy due to monthly reports, etc.

Plant Mail Unit (Contin)

Addressograph work continued at a high level, and three new files were added consisting of approximately 2000 plates. Also collating work doubled last month's production figure, and arrangements have been made for additional layout space to provide a more efficient work arrangement and to enable acceptance of more work for the collator.

Types and Pieces of Mail Handled	February	March
Internal	5,214,600	4,195,480
Postal	92,406	93,454
Special	2,329	2,267
Registered	12,831	13,338
	5,322,166	4,304,539
Total Postage Used	$3,976.07	$3,952.33
Total Teletypes Handled	4,090	3,667
Total Store Orders Handled	660	568

Addressograph	Number of Runs	Total Copies	Number of Runs	Total Copies
Plate name list	117	190,182	117	166,940
Housing List	19	48,722	19	47,698
Payroll List	12	18,962	13	14,062
Total new plates	3,962		4,281	
Total corrected plates	6,284		5,325	
	10,246		9,606	
Machine Collating (sheets)	90,554		157,870	

Printing Unit

The number of orders completed and copies printed this month was considerably less than in February. The following priority requests account somewhat for the reduction in production.

One Top Secret order for AEC, 36 plates for five copies each.
8000 brochures - Natural Gas Information
8000 brochures - Hospital disposal information
(The above were printed on both sides on 11 x 17 paper and folded)
8000 correction letters on Natural Gas information
10,400 General Manager - News Letter
100 copies, General Manager's Report, "1955 at Hanford"

First photo copy for the General Manager's report was received March 7, and final copy on March 15. Completed copies were delivered to Classified Files, March 22.

Printing Unit (Contin)

Two large size orders were completed during the month.

60,000 copies S.W.P. Permit Authorization Card, printed both sides, Form R-670-DS

87,000 Key Sort Cards, Form R-194

Backlog of printing orders on hand was reduced during the month by a total of 32 orders.

Work Completed	February	March
Orders Received	440	362
Orders Completed	459	392
Average Orders on Hand	99.9	91.4
Copies Printed	1,603,664	951,704
Vacuum Frame plated masked	760	440
Negatives Processed	985	639
Photo copy prepared	398	257
Litho plates processed	967	591

Stenographic Unit

Two Stenographers and four Stenographer-Typists were assigned to the Stenographic Unit during the month. Seven permanent transfers were made to other plant units. Due to the work load in the office, only twelve loan assignments could be made.

Draft of revision of "This Way, Please" was completed and sent to Employee Communications for checking on March 23.

The Stenographic and Secretarial Program (Training and Development) was given by the Supervisor, Stenographic Unit on March 21, and March 22, to stenographic and clerical personnel in Metal Preparation Section. The program is scheduled for the balance of personnel in these classifications in Metal Preparation during April.

Work was performed in March for 73 people throughout the plant. Larger assignments included 90 hours work on preparation of plant-wide Good Neighbor Fund mailing, 102 hours typing of Printing and Duplicating orders listings for Duplicating Unit, 62 hours duplimat typing for Design Analysis, 139 hours typing of equipment history cards for Separation Section, 114 hours duplimat and ditto typing of reports for General and Consolidated Cost Unit, and 99.5 hours duplimat typing of Manufacturing Cost Unit monthly cost reports. All work is current at month's end.

Number of employees March 1, 1956	13
Number of employees March 31, 1956	12
Number of new employees in March	6
Number of transfers in March	7
Number of loan assignments in March	12

Stenographic Unit (Contin)

	February	March
Total Production hours	2,196.5	1,940.5
Training Hours	241.5	223
Unassigned Hours	54	48
Meeting Hours	7	8.5
Absence Hours Paid	---	24
	2,499	2,244

Office Equipment Unit

The expendable office furniture inventory account No. 93 was valued at $18,649 on February 29, 1956, or an average of 6.1 months supply on hand. Withdrawals for the month were $4,002 and receipts were $1,557.

A total of 79 service and work orders were issued during the month. No safety priority orders are outstanding.

There were 516 debit and credit store orders processed during the month or an average of 25 per working day.

Furniture requirements for expansion of 306 building office space has been purchased and received. Tentative delivery dates have been set up for the week of April 9.

Following are furniture transactions carried out during the month:

Item	Issued	Received	Salvage
Bookcase	6	0	1
Blackboard	4	0	0
Cabinet	35	20	27
Card File	7	3	8
Costumer	8	3	5
Chair	291	87	135
Desk	50	37	15
Daveno	14	13	0
Table	45	41	18
Miscellaneous	232	18	42
	692	210	251

Office Machines

The total number of office machines in service and stock on March 20, 1956, was 4,157 or an increase of two machines over the previous month.

A utilization survey of ditto machines has been completed. This survey resulted in three machines being removed from plant inventories. This leaves a total of only 21 machines in service at HAPO.

Office Machine Repair Unit

During the month, a complete inspection was made on the Inserting and Mailing machine, located in the Payroll Section.

Special maintenance work was performed on two Pitney Bowes stamp machines, located in the Central Mail Room. Worn parts were replaced and machines were placed in top condition.

Flexowriter maintenance hours increased during the month due to the fact that two machines were given a complete overhaul.

Instrument repair work consisted of regular routine maintenance and the following:

Overhauled the monitor located at the Richland 300 Area barricade.

Overhauled one Hygro-Thermograph.

Set up a routine check to be made on the first Monday of each month. This check will be made on the Klaxon alarm that notifies the Area Shift Engineers when there is trouble in the 702 machine room. This alarm is located in the 784 Powerhouse, actuated by the Temperature Control Instruments located in the 713 Building, Instrument Control Room.

Repair Tickets processed:	February	March
	557	579

Duplicating Unit

Effective March 1, 1956, the liquidation rate on work performed by duplicating was lowered from fifty to forty-five per cent, thereby permitting customer units to realize a five per cent saving on all work ordered.

On March 8, 1956, a compilation of statistical information concerning Duplicating Unit activities during the period of August, 1955, through January, 1956, was completed. The data was compiled for inclusion within a report prepared for the Property and Maintenance Branch, A.E.C.

During the month, one Model 1250 Offset press, formerly assigned to 760 Duplicating was relocated in the 300 Area Duplicating office in order to handle the Hanford Monthly Report; this is a voluminous document which was previously duplicated in 700 Area.

	February	March
Orders Received	4,551	4,067
Orders Completed	4,435	4,070
Orders on Hand	137	105
Offset Plates	18,054	17,563
Offset Copies	1,146,778	1,182,029
Verifax Masters	3,756	3,960
Verifax Copies	9,887	12,090
Ditto Masters	443	492
Ditto Copies	9,661	11,552

Duplicating Unit (Contin)

	February	March
Xerox Plates	2,668	2,355
Ozalid Masters	125	53
Ozalid Copies	560	692
Embosograf Orders	20	24
Embosograf Copies	82	632
Number of copies duplicated	1,169,636	1,209,350

ADMINISTRATION AREA MAINTENANCE SUB-SECTION

Five movable partition installations were made in 700 Area and two in Central Stores.

Unfilled installation orders on hand will absorb majority of shipment recently received. Requisition for approximately 690 lineal feet has been temporarily held up by the Commission.

Seven office moves were made in March.

Space in 770-B Building, recently vacated by Audio-Visual Unit, was assigned to GE News.

Dormitory W-16 was vacated by FHA appraisal personnel and is being held in stand-by until HHFA sales force is assembled. W-15 continues in standby pending receipt of word from AEC as to whether it will be utilized by HHFA sales personnel.

Lobby of 703 Building was repainted. Hand rails were replaced and safety tread was installed in entrance aisle.

Information has been submitted to Washington by HOO for use in preparing "certificate of need" for new office building. Following issuance of this certificate it is anticipated that GSA will proceed with detailed study on new building requirements.

Ground space along south side of 700 Area, formerly occupied by 722 series hutments, was brought to grade and stabilized to reduce blowing of dust.

Review of job hazard breakdowns was continued, in connection with safety meetings.

With exception of orders to anchor approximately 200 file cabinets (most of which were received after issuance of new memo from Safety), only two "safety" work orders, which were received on March 26 and 28, were incomplete at end of month.

Building and Equipment Maintenance

All work was completed on March 29, 1956 on the installation of a total of 12 "Comfort" evaporative coolers at Buildings 761 and 762. Eight of these new coolers are rated at 10,000 cfm and four are rated at 7,500 cfm and they are replacements for coolers which did not have the capacity to adequately serve these buildings.

Cycle painting completed includes 15 rooms, the second wing hallway, and second to third wing connecting hallway in Building 703; seven rooms, the reception room, and the west wing hallway in Building 760; 14 rooms, the reception room, and the west first floor hallway in Building 762.

Building and Equipment Maintenance (Contin)

Several roof leaks were repaired on Buildings 702-B, 705, 707, 713, 744, 760 and 762.

Hauserman partition installations completed in the 700 Area this month include: 16 lineal feet in Room 332, 16 lineal feet in Room 112, and 16 lineal feet in Room 2410, all in Building 703; 52 lineal feet in Building 712; 30 lineal feet in northeast corner of 723; 75 lineal feet in southwest second floor section of Building 761; and 50 lineal feet at Central Stores.

Acoustic tile was applied on ceilings of four rooms in Building 760, comprising a total area of 784 square feet.

A 1500 lb/hr condensate type steam meter and meter pit were installed on the east side of the Village Theatre.

Fifteen combination pressure and temperature relief valves were installed on hot water tanks and this completes the installation of these safety valves on all hot water tanks in the 700 Area with the exception of the one tank at 701-B which will be equipped immediately.

Thirty metal shelves were assembled at Building 712 and this job is now 65% complete.

The sign painter worked a total of 44 hours on special work at 100H Area.

A total of 40 man hours were utilized in crating of materials for shipment by Stores Excess group.

Repairs were completed on Civil Defense Mobile Control Center, including straightening of damaged air cooler and brackets, patching of roof leaks, and re-cementing of floor tile.

Miscellaneous items of work completed in 700 Area included: installation of a total of 59 duplex receptacles, 13 light fixtures, six exhaust fans, three buzzer systems, fire evacuation horn in reproduction room of 760, a range circuit, and three radiators; replacement of push nipples on 25 radiators, repair of eight PRV main valves and six PRV pilot valves; cleaning and protective painting of cooler pans in Buildings 702, 704, 707, 723, 729, 770-A, 770-B and 744; replacement of bearings on cinder return fan at 784; fabrication of 10 plastic test tube holders for 747 laboratory; remodeling of receptionist desk at 761; and fabrication of a large linoleum covered bulk storage cabinet for 760 Reproduction room.

Work completed for Transportation Section included: installation of 17 duplex receptacles, 12 light fixtures in Heavy Equipment Shop, two exhaust fans at 1171, emergency circuit to provide battery power for fire alarm system, and heavy hinges on trash containers in bus clean-out lane; repair of electric range at 1170, and battery charger at locomotive shop; inspection of building fire-alarm system; semi-weekly testing of Civil Defense sirens; and round-the-clock operation and maintenance of oil fired furnaces and boilers.

Routine seasonal maintenance was continued on all buildings and equipment in the 600, 700, Central Stores and Transportation Shops areas, and glazing and locksmith service was supplied to all areas.

Building and Equipment Maintenance (Contin)

Building Services

Two coats of protective floor seal were applied to wood floors in W-17, W-21 and 50% of W-10; and a second coat was applied to floors in 761, 762 and 760.

Color seal was applied to concrete floors in 716, four restrooms in 762, restrooms and basement office of 702, and main hall of 717.

Windows were washed in Building 704 and Building 703 with exception of those on second floor of first and third wings.

Routine janitorial service was continued according to schedule in all 700 Area buildings, Central Stores and Buildings 1170 and 1171 of Transportation Section.

Steam Operation

Numbers 1, 2 and 4 boilers were in operation at the beginning of the month, with No. 3 in reserve.

On March 13, No. 3 boiler was placed in service and No. 1 unit removed from the line to permit repairs to be made to the motor driving the cinder return fan on the latter boiler. It was found that the motor bearings had again failed after less than two months operation.

Decreased heating load permitted No. 2 boiler to be removed from service on March 19.

At the close of the month, Nos. 3 and 4 boilers were in service with Nos. 1 and 2 in reserve.

The quantity of steam generated was 14.2% less than for the same period of the previous year.

One load of sulphuric acid was send to 200-E Area and one load to 384 Power House.

No. 5-A coal conveyor was cleaned up, oil leaks corrected and conveyor housing covers sealed with sponge rubber to reduce the coal dust problem. Initial indications are that results are successful and it is contemplated that this treatment will be extended to the remaining conveyors within the building.

A test schedule was established with Instrument Maintenance to regularly test that portion of the alarm system located in the 784 Building which warns of malfunctioning of the heating and ventilating equipment serving the IBM 702 machine in 713 Building.

At Central Stores Heating Plant, the hazardous condition of "false starts" of the Ray oil burner was corrected by the electricians. Previous to this correction, under certain conditions the burner attempted to start several times before the purge cycle was completed, creating a potential fume explosion hazard.

Steam Operation (Contin)

Coal consumed: 1,649.50 net tons.

Steam generated:	23,884.5 M. Lbs.
Steam leaving plant:	20,875.0 M. Lbs.
Steam delivered:	18,345.4 M. Lbs.
Total water softened:	3,085,400 Gallons
Total soft water sent to Kadlec Hospital:	68,980 Gallons
Total soft water sent to 784 Heating Plant:	3,016,420 Gallons

TELEPHONE SUB-SECTION

The "Areas to Richland" trunk arrangement was modified on March 31 to permit area telephone users to dial directly to Richland Community telephones. Previously all such calls were completed with the assistance of the Plant operator.

An evaluation appraisal of the Plant Telephone System facilities was begun by R. W. Beck and Associates on March 21 in connection with Special Agreement SA-7.

The initial draft of a Project Proposal covering replacement and modernization of Plant Security radio facilities was completed by the Project Engineering Unit and reviewed by the Telephone Sub-Section.

Plant Telephone Operations

Installed a short 26-pair lateral in the 300 area to serve the 3746 Building and removed several aerial drop wires.

Inventoried service drop wires in each area; this was done to further the plan of accounting for capital items in accordance with the uniform system of accounts now being used for the Telephone System.

Completed a cable addition and rearrangement in the 300 area to provide ten additional cable circuits needed to serve new offices in the 306 Building.

In the 700 area exchange, traffic meters for the Seattle, Portland, Spokane and Yakima leased lines were rewired in order to obtain registration of calls and circuit usage time for each circuit. Previously the meters indicated number of calls and circuit usage for each group of lines.

Following changes were made in numbers of area to Richland trunks: (1) BY to Plant operator trunks were reduced from 15 to 3. (2) 300 to 700 area trunks were reduced from 39 to 33. (3) Twelve BY to Richland Exchange trunks were added. (4) Six 300 area to Richland Exchange trunks were added.

Conducted tests on storage batteries in the White Bluffs Exchange to determine condition and reserve capacity.

Approximately 28 cable-crew days were expended performing trunk cable gas pressurizing work.

Installed one mile of aerial iron wire on existing poles near the 181-D Building and used the newly installed circuit to reroute Security Patrol circuit PTL 29.

Located and cleared a moisture fault in a 13 quad local cable in the 100-D area.

Plant Telephone Operations (Contin)

Located and cleared a ground fault on one pair in the BY White Bluffs trunk cable.

Maintenance of PAX and PBX systems serving the 202-A, 202-S, 271-T and 234-5 Buildings required 122 manhours.

Three bids were received (by the Contract Unit) and reviewed for four editions of a Plant telephone directory; lowest of the three bids, $5,476, was submitted by the General Telephone Directory Company; the Walla Walla Union Bulletin bid $5,870, and the Telephone Directory Company of Everett, Washington, bid $9,000.

Letters were sent to all Plant organizations requesting information needed for the next edition of the Plant telephone directory.

A contract was awarded on March 20 to Frank Lohse to provide and erect a 12 x 20 metal storage building at the BY Tandem office. The bid amount was $2,240 and the work is to be completed within 45 days after notice to proceed.

Store orders were issued and processed to transfer the cost of subscriber station apparatus from Inventory Stock (0420-952) to Investment (G-80036). The total value of the transferred material was approximately $4,600.

Commercial Telephone Operations

Gas pressurization of the Kennewick and Pasco trunk cables was completed during the month.

An unusual amount of wind-damage repair work to cables and service drops was required during the first week of the month.

Brought all drawings pertaining to Richland cable distribution system up-to-date and furnished copies to R. W. Beck and Associates for use in connection with inventory and evaluation appraisal of the Community Telephone facilities.

Replaced the multiple drop wires serving the Richland Electrical Maintenance Unit and the Densow Drug Store with neoprene cables to reduce further maintenance.

Engineered two jobs relative to pole line relocation and replacement.

Modified the Richland Exchange ring-back tone to include a 400 cycle component to conform to Bell System standards for the benefit of long distance callers to Richland.

Modified the Richland Exchange test-desk to provide more flexibility in the use of test selectors.

Made cabling changes in the Richland Exchange to accommodate new direct trunks from the Plant BY and 300 Area Exchange.

Radio System Operations

Shop serviced 51 mobile receivers, 49 mobile transmitters, 7 fixed-station transmitters, 7 fixed-station receivers, 1 intercom system, 4 radio remote control consoles, 1 public address amplifier, 1 tape recorder and 4 pack-type transmitter-receiver units.

Radio System Operations (Contin)

Field serviced 108 mobile transmitter-receiver units and 15 fixed-station units.

Removed five mobile transmitter-receiver units together with associated auxiliary items.

Installed four mobile transmitter-receiver units and associated auxiliary items.

Routine serviced four fixed-station transmitter-receiver units.

Installed for demonstration purposes at the Bus Dispatcher's office a pair of loud speakers operated by radio from the 703 Building.

Following Radio Station outages occurred during the month:

March 6, Station KKE 624, No. 14, 100-H Area, was out of service from 3:20 AM to 9:52 AM due to tube failure (outage reported to Radio Maintenance at 8:00 AM).

March 7, Station KKE 624, No. 2, Yakima Barricade, was out of service from 1:00 PM to 1:45 PM due to tube failure.

March 17, Station KKE 624, No. 13, Army Post, was out of service from 10:20 AM to 1:40 PM due to AC power cord plug being pulled out of receptacle.

March 19, Station KGB 513, No. 1, Central Fire Station in Richland, was out of service from 2:06 PM to 2:32 PM due to tube failure.

March 19, Station KKE 624, No. 9, 100-F Area, was out of service from 8:00 AM on the 18th to 9:00 AM on the 19th due to tube failure. (Outage reported to Radio Maintenance at 8:00 AM March 19, 1956).

March 22, Stations KKE 624 and KEB 886, Gable Mountain, were out of service from 1:05 PM to 2:00 PM due to a transformer fuse being blown by Army personnel and our emergency plant failing to start. Failure of emergency power plant to start was due to contact trouble.

March 22, Station KEB 886 was out of service from 3:40 PM to 4:45 PM due to a blown fuse in the transmitter.

March 27, Station KKE 624, No. 2, Yakima Barricade, was out of service from 3:00 AM to 10:30 AM due to tube failure (outage reported to Radio Maintenance at 8:00 AM)

March 28, Station KEB 886, Gable Mountain, was out of service from 3:30 PM to 4:28 PM due to a blown fuse in the transmitter unit.

Statistical Data

	At 20th of March	Change from Previous Month	Change from Year Ago
Residential Subscribers	6232	+ 20	+ 231
Business Subscribers	418	- 3	- 66
Paystations (North Richland)	16	Same	- 10
Paystation Telephones	48	+ 1	- 20
Official Subscribers:			
Richland Exchange	228	- 3	- 759
700-1100 Areas	926	+ 5	+ 926
Process Areas Exchanges	1662	- 10	- 85
		+ 10	+ 217

Statistical Data (Contin)

New Service Requests Received during the Month:

For residential service	74
For business service	6
TOTAL	80

Service Orders Processed:

In connection with business & residential service:	405
In connection with plant service	126
TOTAL	531

Telephone Facilities - Installed, In Service and Available

	Exchange Lines			Party Lines
	Installed	In Service	Available	Available
North Richland	600	16	584	
Richland Community	4015	3705	310	857
700-1100 Areas	1230	905	325	
Process Areas	2050	1657	393	
	7895	6283	1612	857

Radio Stations - In Service

	At 20th of March	Change from Previous Month	Change from Year Ago
Fixed Stations	34	0	- 1
Mobile Stations	159	0	+ 4
	193	0	+ 3

SECURITY AND PATROL SUB-SECTION

Document Report

Number of classified documents and prints unaccounted for as of March 1: 291
(97 of the above 291 documents are chargeable to du Pont Company).

Number of classified documents and prints reported as unaccounted for during March: 0

Number of classified documents and prints either recovered or downgraded in classification during March: 2

Number of classified documents and prints remaining unaccounted for as of April 1: 289
(97 of the above 289 documents are chargeable to du Pont Company)

Non Technical Document Review Board

The Board held only one meeting during March and reviewed a total of 52 documents. Of this number -

42 had their classification retained, and
10 were downgraded to "Official Use Only."

Security Education

Six Security articles appeared in the GE News during the month.

There were 435 security meetings held and attended by 6,229 HAPO employees. A representative of the Plant Protection Services Unit showed one of the security films at these meetings or presented the tape recording of Ronald Reagan's recent lecture at Hanford, as indicated below:

Film Title	Number of Meetings	Average Attendance per Meeting	TOTAL
The Living Contract	1	43	43
In Any Direction	3	34	102
Ronald Reagan's Lecture on "Communism in Hollywood"	64	22	1,408

The film entitled "In Any Direction" is the most recent film produced at Hanford and was just released during this reporting period.

GE Security Bulletin No. 101, entitled "The Communist P.S.Q." was issued March 27.

Six hundred and fifty copies of the security poster with the slogan "Secure the Top Half to Insure the Whole" were posted in the plant areas.

The March 30 issue of "Management News Bulletin" announced 23 showings to interested technical personnel of a Russian film on a power reactor which was obtained from the Atomic Energy Commission.

Sixty employees of the General Electric Company received a "Q" security orientation talk from either a representative of the Plant Protection Services Unit or a Patrol Supervisor, and eleven employees received the "L" security orientation lecture during the reporting period.

Statistical Report of Patrol Activities

	100-B	100-D	100-F	100-H	100-K	200-E	200-W	300
Pat Searches	89	35	76	53	72	0	0	1
Escorts	14	22	16	30	102	26	72	5
Ambulance runs	1	1	4	2	0	0	2	7
Passes issued:								
One day temporary	15	18	10	8	7	25	35	52
Travel	0	0	0	0	0	0	0	133
Red Tag	57	55	21	27	39	171	215	81
Telephonic	0	0	0	49	0	0	0	13
Supervisor's Post Contacts	402	179	177	53	335	302	432	231

Other Patrol Activities (Computed by Hours)

	100-B	100-D	100-F	100-H	100-K	200-E	200-W	300 &700
File Check	187	263	261.5	433	376	272	272	2,220
Building Check	341	85.75	247.6	1,007	376	272	272	720

Arrest Report

Violation	Number of Violations	Cont. Cases from Feb.	Cases Cleared	Pending	Fined
Illegal Parking	1	2	0	3	0
Negligent Operation	1	0	1	0	1
No Driver's License in Possession	2	0	2	0	2
Speeding	1	0	1	0	1
TOTALS	5	2	4	3	4

Citation tickets issued: 5
Warning tickets issued: 58
Verbal warnings: 0

Patrol Training Activities

523 Patrolmen attended Round Table meetings, safety and security meetings during the reporting period. There are 395 patrolmen, consequently some of the men attended more than one meeting.

192 Patrolmen attended Firearms Training during the same period.

Audit and Inspection

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 710 audits.

Security Administration

Daily Badge Log entries	2,413
"Q" clearances	60
"L" clearances	11
Formal "P" clearances issued	35
"P" approval clearances issued	24
Category access granted	49
Category access withdrawn	38
Category access revised	47
Number of photos for "A" badges	752
Number of photos for "B" badges	3,020
Number of persons re-photographed	646

Security Administration (Contin)

Photo identification passes laminated and issued:	969
"A" badges assembled and distributed to the areas:	667
"A" badges received from the areas:	240
"A" badges received from the areas for repair:	29

Top Secret Clearances

Clearances cancelled:	40
Clearances requested:	43
Clearances granted:	35

[redacted]

HANFORD ATOMIC PRODUCTS OPERATION
General Electric Company
Richland, Washington

REPORT OF VISITORS FOR PERIOD ENDING MARCH 31, 1956

Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data Class.	Restricted Data Unclass.	Areas
EMPLOYEE COMMUNICATIONS AND RELATIONS SECTION-EMPLOYEE AND PUBLIC RELATIONS DEPARTMENT							
I. Visitors to this Works							
J. Clark Division of Finance U. S. Atomic Energy Comm. Washington, D. C.	Study of Purex facility using models under repair in Model Shop	B. E. Leslie	3-15-56	3-15-56	X		700-723
SALARY AND WAGE ADMINISTRATION SECTION-EMPLOYEE AND PUBLIC RELATIONS DEPARTMENT							
I. Visitors to this Works							
J. L. Cordaro Sandia Corporation Albuquerque, New Mexico	Wage and salary administration survey	J. J. Tagen	3-19-56	3-19-56		X	700
M. A. McCutchan Sandia Corporation Albuquerque, New Mexico	Wage and salary administration survey	J. J. Tagen	3-19-56	3-19-56		X	700
ENGINEERING DEPARTMENT - ADVANCE ENGINEERING SECTION							
I. Visits to other Installations							
P. F. Gast to: Argonne National Lab. Lemont, Illinois	Discuss reactor coolants	N. Hilberry Mr. Bigler	3-2-56	3-2-56	X		
P. F. Gast to: Oak Ridge National Lab. Oak Ridge, Tennessee	Lecture on Hanford Reactor Technology	F. C. Vanderlage	3-5-56	3-7-56	X		

DECLASSIFIED

DECLASSIFIED

Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data Class.	Restricted Data Unclass	Areas
ENGINEERING DEPARTMENT - ENGINEERING ADMINISTRATION SECTION							
I. Visitors to this Works							
G. H. Hupman General Electric Company New York, New York	Discuss Personnel Register	O. H. Greager W. M. Harty R. M. Smithers	3-19-56	3-19-56		X	700 300 XXX
C. F. Savage General Electric Company New York, New York	Discuss Personnel Register	O. H. Greager W. M. Harty R. M. Smithers	3-19-56	3-20-56		X	700 300 XXX
II. Visits to other Installations							
J. A. Merrill to: Los Alamos Scientific Lab. Los Alamos, New Mexico	Chemical specifications and their effect on product quality	M. Roy W. W. Carter G. H. Tenney K. Ziegler S. Smith	3-14-56	3-15-56	X		
ENGINEERING DEPARTMENT - DESIGN SECTION							
I. Visitors to this Works							
D. E. Irons Aircraft Nuclear Propulsion Lockland, Ohio	Air logistic power plant	R. H. Beaton	3-18-56	3-19-56	X		100-K 105-KW 200-W Redox, Purex
II. Visits to other Installations							
J. P. Corley to: Union Carbide Nuclear Co. Oak Ridge, Tennessee	Inspect cooling tower installations and their operation	A. P. Huber M. F. Schwenn K. E. Jones A. B. Fuller	3-12-56	3-14-56	X		
G. L. Davis to: E. I. du Pont de Nemours Savannah River Plant Augusta, Georgia	Fuel element fabrication and instrumentation developments	T. C. Evans	3-12-56	3-13-56	X		

[redacted]

[redacted]

Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data Class.	Restricted Data Unclass.	Areas
G. L. Davis to: Sylvania Electric Products Bayside, New York	Discuss fuel element fabrication techniques	S. Roboff	3-14-56	3-15-56	X		
E. L. Reed to: E. I. du Pont de Nemours Savannah River Plant Augusta, Georgia	Fuel element fabrication and instrumentation developments	T. C. Evans	3-12-56	3-13-56	X		
ENGINEERING DEPARTMENT - PILE AND SEPARATIONS TECHNOLOGY SECTIONS							
I. Visitors to this Works							
W. F. Arnold Radiation Laboratory University of California Livermore, California	Fabrication consultation on Whitney Project	O. J. Wick	3-13-56	3-14-56	X	200-W	231, 234,235
O. M. Barlow, Jr. Radiation Laboratory University of California Livermore, California	DXT set up and collaboration	O. J. Wick	3-14-56	3-17-56	X	200-W	231, 234,235
C. E. Bussert National Lead Company Fernald, Ohio	Discuss fuel element fabrication	V. R. Cooper	3-27-56	3-31-56	X	100-B 300	105-C 303
R. S. Bybee Radiation Laboratory University of California Livermore, California	Fabrication consultation on Whitney Project	O. J. Wick	3-22-56	3-23-56	X	200-W	231, 234,235
M. Doumas Westinghouse Atomic Power Div. Pittsburgh, Pennsylvania	Discuss operations of KAPL-120 loop test	J. A. Berberet J. M. Atwood	3-8-56	3-9-56	X	100-D 100-H 100-K 300-	XXX 105 105-KE, KW 303
K. W. Downs Brookhaven National Lab. Upton, Long Island, New York	Discuss graphite uranium, exponential and critical experimental reactors	G. W. Stuart	3-9-56	3-9-56	X	100-K 300	105-KE, KW 303

[redacted]

DECLASSIFIED

[redacted]

Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data Class.	Restricted Data Unclass.	Areas
J. A. Fellows Mallinckrodt Chemical Works St. Louis, Missouri	Review metal fabrication problems as affecting Reactor behavior	V. R. Cooper	3-13-56	3-15-56	X		100-B 105-C 100-K 105-KE, KW 200-E XXX 200-W XXX 300 303
R. H. Fillnow Westinghouse Atomic Power Div. Pittsburgh, Pennsylvania	Discuss operations of KAPL-120 loop test	J. A. Berberet	3-8-56	3-9-56	X		100-D XXX 100-H 105 100-K 105-KE, KW 300 303
C. M. Henderson Mallinckrodt Chemical Works St. Louis, Missouri	Review metal fabrication problems as affecting Reactor behavior	V. R. Cooper	3-13-56	3-15-56	X		100-B 105-C 100-K 105-KE, KW 200-E XXX 200-W XXX 300 303
R. H. Henderson Radiation Laboratory University of California Livermore, California	DXT set up and collaboration	O. J. Wick	3-13-56	3-16-56	X		200-W 231, 234,235 300 XXX
J. M. Hendrie Brookhaven National Lab. Upton, Long Island, New York	Discuss graphite uranium, exponential and critical experimental reactors.	G. W. Stuart	3-9-56	3-9-56	X		100-K 105-KE, KW 300 303
C. O. Herrala Radiation Laboratory University of California Livermore, California	Fabrication consultation on Whitney Project	O. J. Wick	3-28-56	4-1-56	X		200-W 231, 234,235
C. T. Lohrey Knolls Atomic Power Lab. Schenectady, New York	KAPL-120 loop modifications and problems of third run	T. R. Neville, Jr.	3-7-56	3-9-56	X		100-D XXX 100-H 105 100-K 105-KE, KW 300 303; 700

[redacted]

[redacted]

Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data Class.	Restricted Data Unclass.	Areas
D. B. MacFarlane, Jr. Radiation Laboratory University of California Livermore, California	Fabrication consultation on Whitney Project	O. J. Wick	3-29-56	3-30-56	X	200-W	231, 234,235
J. B. McFerran General Engineering Lab. Schenectady, New York	Discuss instrumentation applicable to flow and temperature monitoring on Reactors	M. T. Slind	3-7-56	3-9-56	X	100-D 100-K 300	105 105-KE, KW XXX
M. D. Martin Radiation Laboratory University of California Livermore, California	Consultation re future planning for Whitney Project for FY-1957	J. J. Cadwell	3-26-56	3-27-56	X	100-K 200-W 300	105-KE, KW 231, 234,235 XXX
J. L. Matherne Oak Ridge National Lab. Oak Ridge, Tennessee	Discuss metal recovery plant operations	R. J. Sloat	3-21-56	3-23-56	X	200-E 200-W 300	202-A Redox, 221-U XXX; 700
F. J. Minuth Argonne National Lab. Lemont, Illinois	Compile data for gamma irradiation facilities catalog	J. A. Berberet	3-9-56	3-9-56	X	100-K 300	105-KE, KW XXX
W. H. Moran Radiation Laboratory University of California Livermore, California	Fabrication consultation on Whitney Project	O. J. Wick	3-13-56 3-19-56 3-23-56	3-15-56 3-23-56 3-31-56	X X X	200-W 300	231, 234,235 XXX
T. R. Neville, Jr. Knolls Atomic Power Lab. Schenectady, New York	Liaison work on KAPL-12- loop program	J. A. Berberet	2-8-56	7-1-56	X	100-D 100-F 100-H 100-K 300	XXX XXX (3-20-56) 105 105-KE, KW 303
R. A. Nickerson Radiation Laboratory University of California Livermore, California	DXT set up and collaboration	O. J. Wick	3-13-56	3-16-56	X	200-W 300	231, 234,235 XXX

DECLASSIFIED

GL-22

DECLASSIFIED

Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data Class.	Restricted Data Unclass.	Areas
D. J. O'Connell Radiation Laboratory University of California Livermore, California	Fabrication consultation on Whitney Project	O. J. Wick	3-20-56	3-23-56	X		200-W 231, 234,235
W. G. Petty Mallinckrodt Chemical Works St. Louis, Missouri	Review metal fabrication problems as affecting Reactor behavior	V. R. Cooper	3-13-56	3-15-56	X		100-B 105-C 100-K 105-KE, KW 200-E XXX 200-W XXX 300 303
G. A. Price Brookhaven National Lab. Upton, Long Island, New York	Discuss graphite uranium, exponential and critical experimental Reactors	G. W. Stuart	3-9-56	3-9-56	X		100-K 105-KE, KW 300 303
M. J. Ryan Radiation Laboratory University of California Livermore, California	Fabrication consultation on Whitney Project	O. J. Wick	3-19-56	3-24-56	X		200-W 231, 234,235
D. T. Scalise Radiation Laboratory University of California Livermore, California	Fabrication consultation on Whitney Project	O. J. Wick	3-19-56 3-23-56	3-23-56 3-31-56	X		200-W 231, 234,235
H. J. Schaffer Mallinckrodt Chemical Works St. Louis, Missouri	Review metal fabrication problems as affecting Reactor behavior	V. R. Cooper	3-13-56	3-15-56	X		100-B 105-C 100-K 105-KE, KW 200-E XXX 200-W XXX 300 303
D. C. Sewell Radiation Laboratory University of California Livermore, California	Consultation re future planning for Whitney Project for FY-1957	J. J. Cadwell	3-26-56	3-27-56	X		100-K 105-KE, KW 200-W 231, 234,235 300 XXX
R. Sher Brookhaven National Lab. Upton, Long Island, New York	Discuss graphite uranium exponential and critical experimental Reactors	G. W. Stuart	3-9-56	3-9-56	X		100-K 105-KE, KW 300 303

[redacted]

[redacted]

Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data Class.	Restricted Data Unclass.	Restricted Data Areas
G. E. Steers Radiation Laboratory University of California Livermore, California	Fabrication consultation on Whitney Project	O. J. Wick	3-21-56 3-23-56	3-23-56 3-31-56	X	200-W	231, 234,235
K. Street Radiation Laboratory University of California Livermore, California	Consultation re future planning for Whitney Project for FY-1957	J. J. Cadwell	3-26-56	3-27-56	X	100-K 200-W 300	105-KE, KW 231, 234,235 XXX
W. E. Stockton Radiation Laboratory University of California Livermore, California	Fabrication consultation on Whitney Project	O. J. Wick	3-19-56 3-23-56	3-23-56 3-31-56	X	200-W	231, 234,235
C. H. Walden National Lead Company Fernald, Ohio	Discuss fuel element fabrication	V. R. Cooper	3-27-56	3-30-56	X	100-B 300	105-C 303
G. C. Westfall Knolls Atomic Power Lab. Schenectady,New York	Discuss irradiations for KAPL-120 loop program	J. A. Berberet T. W. Neville, Jr. J. M. Atwood	3-29-56	3-30-56	X	100-H 100-K 300	105 105-KE, KW 303
J. K. Wheater Radiation Laboratory University of California Livermore, California	DXT set up and collaboration	O. J. Wick	3-13-56	3-16-56	X	200-W 300	231, 234,235 XXX
K. C. Dewalt General Electric Company Schenectady, New York	Discuss plutonium technology and handling	O. F. Hill E. R. Irish	3-15-56	3-15-56	X	200-E 200-W	202-A 231
M. L. Feldman General Electric Company Schenectady, New York	Discuss plutonium technology and handling	O. F. Hill E. R. Irish	3-15-56	3-15-56	X	200-E 200-W	202-A 231
R. H. Johnson Wright Patterson Air Force Base Ohio	Regarding Army gas loop	R. E. Baars	3-21-56	3-22-56	X	100-F 100-K	105 105-KE

DECLASSIFIED

DECLASSIFIED

Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data Class.	Restricted Data Unclass.	Areas
A. S. Messick E. I. du Pont de Nemours & Co. Savannah River Plant Augusta, Georgia	Discuss 234-5 operations	O. F. Hill K. M. Harmon H. H. Hopkins	3-19-56	3-21-56	X		200-W 234, 235
V. J. Reilly E. I. du Pont de Nemours & Co. Savannah River Plant Augusta, Georgia	Discuss 234-5 operations	O. F. Hill K. M. Harmon H. H. Hopkins	3-19-56	3-21-56	X		200-W 234, 235
J. D. Webster General Electric Company Schenectady, New York	Discuss plutonium technology and handling	O. F. Hill E. R. Irish	3-15-56	3-15-56	X		200-E 202-A 200-W 231
II. Visits to other Installations							
R. J. Anicetti to: Westinghouse Atomic Power Pittsburgh, Pennsylvania	Attend uranium oxide meeting on uranium oxide fuel materials	J. Belle	3-20-56	3-20-56	X		
J. A. Berberet to: U. S. Atomic Energy Comm. Savannah River Operations Office Augusta, Georgia	Attend meeting on production of cobalt 60	N. H. Stetson	3-25-56	3-26-56	X		
S. H. Bush to: Aircraft Nuclear Propulsion General Electric Company Cincinnati, Ohio	Attend GE-Intra Company fuel element meeting	A. E. Focke	3-1-56	3-1-56	X		
J. J. Cadwell to: Radiation Laboratory University of California Livermore, California	Consultation re technical program for FY-1957	D. C. Sewell	3-6-56	3-8-56	X		
J. L. Carter, Jr. to: Knolls Atomic Power Lab. Schenectady, New York	Discuss radiation effects in solids	J. B. Sampson	3-19-56	3-20-56	X		

[redacted]

Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data Class.	Restricted Data Unclass.	Areas
J. L. Carter, Jr. to: Oak Ridge National Lab. Oak Ridge, Tennessee	Discuss radiation effects in solids	D. S. Billington	3-21-56	3-23-56	X		
J. M. Davidson, III to; Material Testing Reactor Phillips Petroleum Company Idaho Falls, Idaho	Installation of GEH 9 Experiment	H. T. Watanabe	3-19-56	3-31-56	X		
R. L. Dickeman to: U. S. Atomic Energy Comm. Washington, D. C.	Attend Advisory Committee on Reactor Safeguards meeting	C. R. McCullough	3-1-56	3-2-56	X		
J. M. Fouts to: E. I. du Pont de Nemours Savannah River Plant Augusta, Georgia	Examine I & E slugs and examination of equipment	T. C. Evans	3-20-56	3-23-56	X		
M. D. Freshley to: Radiation Laboratory University of California Livermore, California	Consultation on fabrication for Whitney Project	M. J. Ryan	3-1-56	3-9-56	X		
L. A. Hartcorn to: Mallinckrodt Chem. Works St. Louis, Missouri	Attend Metallography Subcommittee meeting	H. F. Kloepper	3-13-56	3-15-56	X		
R. E. Isaacson to: Dow Chemical Company Rocky Flats Laboratory Denver, Colorado	Discuss new multiplication factors and acceptance specifications	E. J. Walko D. Brown	3-12-56	3-13-56	X		
R. E. Isaacson to: Los Alamos Scientific Lab. Los Alamos, New Mexico	Meeting re chemical specifications and their effect on product quality	M. Roy W. W. Carter G. H. Tenney D. Smith	3-14-56	3-16-56	X		
R. K. Koler to: National Lead Company Fernald, Ohio	Discuss manufacture of uranium components	A. E. Guay	3-5-56	3-9-56	X		

DECLASSIFIED

DECLASSIFIED

Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data Class.	Restricted Data Unclass.	Areas
R. Neidner to: Material Testing Reactor Phillips Petroleum Company Idaho Falls, Idaho	GEH-4 Experimental Program	D. R. Alvord	3-14-56	3-24-56	X		
W. J. Ozeroff to: Los Alamos Scientific Lab. Los Alamos, New Mexico	Discuss Nuclear Safety Guide	H. C. Paxton	3-1-56	3-2-56	X		
W. J. Ozeroff to: Radiation Laboratory University of California Livermore, California	Discuss Whitney Project	J. Carothers	3-5-56	3-7-56	X		
F. B. Quinlan to: Material Testing Reactor Phillips Petroleum Company Idaho Falls, Idaho	GEH-4 Experimental Program	D. R. Alvord	3-14-56	3-24-56	X		
R. B. Richards to: Battelle Memorial Inst. Columbus, Ohio	Attend Reactor Handbook Editorial Meeting	C. R. Tipton	3-1-56	3-2-56	X		
R. B. Richards to: Vitro Eng. Corporation New York, New York	Attend Reactor Handbook discussions	H. Lowenberg	3-5-56	3-5-56	X		
R. C. Smith to: Dow Chemical Company Rocky Flats Laboratory Denver, Colorado	Discuss process and fabrication techniques	I. B. Venable J. Pringle	3-12-56	3-12-56	X		
R. C. Smith to: Los Alamos Scientific Lab. Los Alamos, New Mexico	Discuss process and fabrication techniques	R. D. Baker J. W. Anderson	3-13-56	3-14-56	X		
W. P. Wallace to: Bridgeport Brass Co. Bridgeport, Connecticut	Discuss zirconium process tube	R. M. Treco	3-26-56	3-26-56	X		

[redacted]

Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data Class.	Restricted Data Unclass.	Areas
W. P. Wallace to: U. S. Atomic Energy Comm. Pittsburgh, Pennsylvania	Zirconium procurement	R. B. Long	3-29-56	3-29-56	X		
O. J. Wick to: Radiation Laboratory University of California Livermore, California	Consultation re technical program for FY-1957	D. C. Sewell	3-6-56	3-8-56	X		
C. D. Wilson to: U. S. Atomic Energy Comm. Pittsburgh, Pennsylvania	Discuss zirconium fabrication	R. B. Long	3-22-56	3-29-56	X		
C. D. Wilson to: Bridgeport Brass Co. Bridgeport, Connecticut	Discuss zirconium fabrication	R. M. Treco	3-26-56	3-27-56	X		
F. W. Woodfield to: Bridgeport Brass Co. Bridgeport, Connecticut	Discuss zirconium fabrication	R. M. Treco	3-26-56	3-27-56	X		
F. W. Woodfield to: U. S. Atomic Energy Comm. Pittsburgh, Pennsylvania	Discuss zirconium fabrication	R. B. Long	3-29-56	3-29-56	X		
R. E. Woodley to: U. S. Atomic Energy Comm. Washington, D. C.	Consult with United Kingdom representatives on in-pile graphite oxidation	E. J. Bloch	3-5-56	3-6-56	X		
C. E. Michelson to: New Brunswick Nat. Lab. New Brunswick, New Jersey	Discuss analytical problems	G. J. Petretic	3-5-56	3-6-56	X		
C. E. Michelson to: Oak Ridge National Lab. Oak Ridge, Tennessee	Discuss analytical problems	M. T. Kelley	3-7-56	3-8-56	X		

DECLASSIFIED

[redacted]

Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data Class.	Restricted Data Unclass.	Areas
FINANCIAL DEPARTMENT							
I. Visits to other Installations							
C. E. Reed to: U. S. Atomic Energy Comm. Savannah River Plant Augusta, Georgia	Review cost methods and procedures	L. Snyder G. Edwards	3-12-56	3-23-56	X		
C. E. Reed to: E. I. du Pont de Nemours Savannah River Plant Augusta, Georgia	Review cost methods and procedures	B. C. Kline G. Coulson	3-12-56	3-23-56	X		
R. M. Watkins to: U. S. Atomic Energy Comm. Savannah River Plant Augusta, Georgia	Review cost methods and procedures	L. Snyder G. Edwards	3-12-56	3-23-56	X		
R. M. Watkins to: E. I. du Pont de Nemours Savannah River Plant Augusta, Georgia	Review cost methods and procedures	B. C. Kline G. Coulson	3-12-56	3-23-56	X		
MANUFACTURING DEPARTMENT - PURCHASING AND STORES SECTION							
I. Visits to other Installations							
W. M. Hunt to: Bridgeport Brass Company Bridgeport, Connecticut	Discuss zirconium fabrication facilities and availability for such work	R. M. Treco	3-26-56	3-26-56	X		
W. M. Hunt to: U. S. Atomic Energy Comm. Pittsburgh, Pennsylvania	Discuss zirconium availability and procurement methods	R. B. Long	3-29-56	3-29-56	X		
MANUFACTURING DEPARTMENT							
I. Visitors to this Works							

[redacted]

[redacted]

Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data Class.	Restricted Data Unclass.	Areas
J. A. Fellows Mallinckrodt Chemical Wks. St. Louis, Missouri	Review metal fabrication problems as affecting Reactor problems	W. M. Mathis S. M. Gill K. V. Stave R. E. Olson	3-13-56	3-13-56	X	300 XXX	
J. D. Gracie North American Aviation Downey, California	View and discuss maintenance and supporting functions required by large radioactive labs.	L. M. Knights K. V. Stave O. C. Schroeder	3-22-56	3-23-56	X	100-K 105-KW 200-E 202-A 300 303	
A. S. Messick E. I. du Pont de Nemours & Co. Savannah River Plant Augusta, Georgia	Discuss Hanford continuous calcination and hydrofluorination furnaces	W. N. Mobley O. F. Hill	3-19-56	3-21-56	X	200-W 231, 234,235 700	
V. J. Reilly E. I. du Pont de Nemours & Co. Savannah River Plant Augusta, Georgia	Discuss Hanford continuous calcination and hydrofluorination furnaces	W. N.Mobley O. F. Hill C. A. Priode	3-19-56	3-26-56	X	200-W 231, 234, 235 700	
II. Visits to other Installations							
G. E. Backman to: Naval Rad. Defense Lab. San Franciso, California	Health Physics Advisor on Operation Redwing	G. L. Baietti J. E. Law	3-12-56	8-1-56	X		
L. V. Barker to: Naval Rad. Defense Lab. San Francisco, California	Participation in Operation Redwing	J. E. Law A. L. Baietti	3-12-56	6-30-56	X		
G. B. Hansen to: Carbide and Carbon Chem.Co. Oak Ridge, Tennessee	Gen. Analytical Control Program	S. R. Sapirie	3-13-56	3-14-56	X		
G. B. Hansen to: National Lead Company Fernald, Ohio	Discuss gas analyses as applied to uranium quality control at National Lead Company	J. W. Robinson	3-15-56	3-16-56	X		

DECLASSIFIED

[redacted]

Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data Class.	Restricted Data Unclass.	Areas
C. A. Priode to: E. I. du Pont de Nemours Wilmington, Delaware	Discuss liaison activity and plant production scheduling matters	V. R. Thayer	3-26-56	3-26-56	X		
C. A. Priode to: U. S. Atomic Energy Comm. Washington, D. C.	Discuss production schedules and matters	E. J. Bloch	3-27-56	3-27-56	X		
A. P. Vinther to: Argonne National Lab. Lemont, Illinois	Discuss mutual reactor neutron flux monitoring and instrumentation	J. M. Harrer	3-5-56	3-6-56	X		
A. P. Vinther to: E. I. du Pont de Nemours Savannah River Plant Augusta, Georgia	Discuss effect of reactor control techniques upon instrument reliability and sensitivity	R. W. Powell	3-7-56	3-9-56	X		
A. P. Vinther to: Brookhaven National Lab. Upton, Long Island, New York	Discuss reactor control problems	F. E. Kruesi	3-12-56	3-13-56	X		
RADIOLOGICAL SCIENCES DEPARTMENT							
I. Visitors to this Works							
C. C. Gamertsfelder Aircraft Nuclear Propulsion Lockland, Ohio	Discuss health physics, neutron measurements and radiobiological dosimetry and particle problems, and meteorological data	H. A. Kornberg J. W. Healy P. R. McCurray W. C. Roesch G. R. Hilst	3-13-56	3-16-56	X	100-F XXX 300 XXX	
J. Sedlet Argonne National Lab. Lemont, Illinois	Discuss bioassay methods, exposure investigation and interpretation	B. V. Andersen J. M. Nielsen D. P. Ebright	3-20-56	3-21-56	X		
R. G. Thomas U. S. Atomic Energy Project University of Rochester Rochester, New York	Discuss metabolism of ruthenium and plutonium	H. A. Kornberg R. C. Thompson	3-22-56	3-23-56	X	100-F 108 300 XXX	

DECLASSIFIED

[redacted]

Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data Class.	Restricted Data Unclass.	Areas
II. Visits to other Installations							
R. A. Harvey to: Brookhaven National Lab. Upton, Long Island, New York	Discuss instrumentation developments and problems	F. P. Cowan	3-23-56	3-23-56	X		
R. A. Harvey to: Knolls Atomic Power Lab. Schenectady, New York	Discuss instrumentation developmens and problems	L. J. Cherubin	3-26-56	3-27-56	X		
J. W. Healy to: U. S. Atomic Energy Comm. Washington, D. C.	Attend Advisory Committee meeting on Reactor Safeguards	E. J. Bloch	3-1-56	3-2-56	X		
B. G. Lindberg to: U. S. Naval Rad. Defense. Lab. San Francisco, California	Participation in Operation Redwing	J. E. Law A. L. Baietti	3-12-56	6-30-56	X		
R. W. Wager to: U. S. Naval Rad. Defense Lab. San Francisco, California	Observe radioactive particle inhalation studies	P. C. Tompkins	3-22-56	3-26-56	X		

DECLASSIFIED

[redacted]

RADIOLOGICAL SCIENCES DEPARTMENT

MARCH 1956

SUMMARY

Thirty-five informal, eleven Class I and three Class II radiation incidents were recorded. All three Class II cases involved exposure of quite localized body areas.

Satisfactory control of I^{131} emission continued. Curiously, though, total radioiodine deposition at one location exceeded limits, due to atomic bomb debris contributions.

The rapid motion of contaminated ground water toward the Columbia River was closely watched.

Quite significant concentrations of Co^{60} in the ground water were reported; this is a previously unidentified contribution.

In biological research, reported studies include the effects of release of unretained reactor effluent, augmented uptake of plutonium in young animals, skin decontamination of plutonium solutions, and cancer production in the thyroid of sheep.

The department continued a high level of participation in the National Academy of Sciences study of radiation effects. Growing stature of the younger scientists of the department was emphasized by invitations to serve on two national committees and participate in a British conference.

DECLASSIFIED

DECLASSIFIED

RADIOLOGICAL SCIENCES DEPARTMENT

MARCH 1956

The month-end force of 431 included 37 supervisors, 99 engineers and scientists, 26 clerical, and 269 other personnel.

Number of Employees on Payroll	
Beginning of Month	425
End of Month	431
Net Increase	6

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 56 radiation incidents, including 12 Class I and 3 Class II incidents. The Class II incidents all involved localized exposure in the range of 2 to 6 rads.

Assistance was given to the AEC in clean-up following a train wreck in Idaho involving a shipment of uranium pieces. The work involved exposure control of personnel in accordance with established arrangements with the AEC, and assistance with location and recovery of pieces on special request of the AEC.

During 1955, 50 additional cases of body deposition of plutonium occurred. None exceeded the current permissible limits. An improvement was noted in the percentage of these cases directly referable to known incidents. Previously, only 50% of the positive cases could be so identified; last year, 70% of the cases arose from known incidents. The increase is believed to be due to increased vigilance and cooperation on the part of all organizations in observing and recording incidents. This matter is of great importance for future radiation protection control. If significant depositions are occurring without special incidents, the whole ventilation engineering of process buildings will have to be revised. Provisionally, we consider it likely that the greater portion of the 30% of 1955 cases not related to known incidents was, in fact, caused by minor specific incidents not identified as such at the time.

I^{131} emission was satisfactorily limited to about 2 curies per week, and there was no excessive deposition on vegetation from this source. However,

Radiological Sciences Department

at one off-site location, the total radio-iodine deposition did exceed limits. This was due to a substantial contribution from foreign atomic bomb debris. This occurrence is a timely reminder of the advantages to our operation of performing fairly elaborate regional monitoring so that contamination conditions not caused by Hanford can be clearly differentiated. Examined in more detail, the bomb debris iodine has 3 components, I^{131}, I^{133}, and I^{135}. The short-lived I^{133} and I^{135} cannot come from our chemical separations processes; of course, their more rapid decay reduces the real hazard at the affected region.

The contaminated underground water continues to move toward the river at an unseemly pace. Already, nitrate ion, which usually leads the parade of mobile ions is detectable in 300 Area wells. It is not impossible that the drinking water supply may be affected.

Cobalt-60, a long-lived and energetic emitter is now being noticed in ground water for the first time. Its concentration exceeds that which is appropriate for off-site consumption. We have not clearly determined why this type of activity was not observed before. It comes from the irradiation in the reactors of Co^{59} impurity in the uranium, cans, or welding material. The conventional analysis for cobalt in the fuel is not sensitive enough to show whether this component is higher in present-day metal.

We suspect that the cobalt is travelling as a complex cobalti-cyanide ion formed from the ferricyanide available in the TBP process. If this proves to be the case, there is not much hope of cheaply converting it to a form that would be retained in soil.

The various phases of the program to develop a continuous automatic monitor for reactor effluent water are proceeding on schedule. This equipment will essentially be a miniature separations plant. From its analyses, the different radiological hazards in the Columbia River will be computed with increased reliability. Ultimately, one can conceive an analog computer mechanism that would provide these answers automatically. The expense of such an installation would only be justified if the river contamination is being pushed close to the limit. This will probably be the case for some future years.

Studies are in progress to evaluate and then alleviate a sub-standard condition in and around the Metal Recovery Building with respect to toxicity of oxides of nitrogen and nitric acid mist.

As part of the long range plan to reduce all radiation survey meters to an assemblage of simplified component parts, the first tests were run with printed circuits. These are both light in weight and easily replaced, reducing maintenance costs. The early tests were most encouraging.

A new approach to the old and difficult problem of differentiating between airborne contamination from plutonium or other alpha emitters and the over-riding background due to radon, thoron, and their daughters was conceived. This instrument is responsive to rate of change of alpha contamination; the natural background is known to change only rather slowly.

DECLASSIFIED

Radiological Sciences Department

In the biological field, the establishment of a factual maximum permissible concentration of chromic ion in water went far enough to fix 0.02 ppm as the level for future planning. This indirectly determines the total amount of sodium dichromate that may be added to reactor process water in a given time. As it is still possible that some minor damage to river organisms may yet be detected at lower concentrations, a conservative policy would perhaps call for 0.01 ppm as a preferred limit.

Direct tests are being made on the effects of unretained reactor effluent on aquatic organisms. The collapse of the baffles of the C-plant retention basin also provides a chance to make a field test of this point, which was previously approved by the Columbia River Advisory Group. It is quite likely that the results will show that retention adds very little to the protection of the river. This would not be true if retention also provided significant thermal cooling.

Sixty percent of all ewes fed 5 μc I^{131} per day for four years have developed tumors of the thyroid. This would be a definitive conclusion if sixty percent happened to represent a number much greater than the actual 3. However, the finding is believed to be reliable enough to establish a sound carcinogenic exposure for this case. Its value lies mostly in correlation with other radiobiological data, for we now have reasonable figures for two control points—the maximum permissible intake and the known cancer producing intake, both on a chronic exposure basis. There are very few evaluated combinations of this type. If we had enough cases to establish a plausible general relationship, some 90% of all research on exposure limits could be eliminated; it is much more difficult to look for all signs of damage at low levels than to look for one sign (cancer cells) at high levels.

Continuing the practical problem of whether the incorporation of isotopes in the organic structure of food sources influences the uptake in the feeding animal, the laboratory finds no appreciable difference for Sr^{90}, a point which has world-wide significance.

Preliminary results on skin decontamination following application of a TBP-CCl_4 plant solution containing plutonium show that the old treatment with permanganate and bisulfite solutions should be 99% effective. The contrary result in the human case of January last would therefore not have been anticipated.

Another special solution containing plutonium (IV) fluoride in nitric acid was tested for transmissibility through skin. Lower values than with the conventional plutonium nitrate solutions were found. The existence of this potential contaminant was pointed out by the Separations Section; the laboratory would like to have information on other unusual combinations.

Work on the uptake of plutonium from drinking water in young animals was continued. The discouraging results of this study also continued. It is possible that we will conclude that the increase in permissible concentration resulting from the department's definitive work with adult animals will have to be eliminated. This would yield a factor significantly greater than 10 for the ratio of in-plant to off-site limit. We suspect that the same is true for P^{32} and Ra, perhaps even for all bone-seekers. This may seriously complicate our waste disposal practices in future years.

Radiological Sciences Department

The department continued a good volume of contribution to the National Academy of Sciences program on radiation effects. Representation on Subcommittees of the National Committee on Radiation Protection also increased by two. Growing stature of the younger scientists of the department was additionally reflected in an invitation to take part in a British conference.

H. M. Parker

Director, kss
RADIOLOGICAL SCIENCES DEPARTMENT

HM Parker:kss

DECLASSIFIED

Radiological Sciences Department

APPENDIX

1. Condensed Exposure Records

Type	Number of Readings	Potential High Results	Confirmed High Results
Pocket chambers - gamma	301,068	27	0
Pocket chambers - slow neutron	2,162	1	0
Film Badges - beta-gamma	50,383	82	0
Neutron film	747	0	0
Pu bioassay	1,3[illegible]9	18	22
F. P. bioassay	1,523	2	0
U bioassay	416	6	0
Alpha hand counts	74,534	0	0
Beta hand counts	69,336	0	0
Thyroid counts	53	0	0

Radiological Sciences Department

2. Regional Monitoring Records

Sample Type and Location	Activity Type	Average Activity Density µc/ml	Trend* Factor
Drinking Water and Related Materials			
Benton City Water Company Well	alpha	8.2×10^{-9}	--
Richland, N. Richland, Benton City Wells	alpha	$(<0.5 \text{ to } 1.0) \times 10^{-8}$	--
100 Areas	beta	$(0.14 \text{ to } 4.7) \times 10^{-6}$	--
200 Areas	beta	$(0.65 \text{ to } 1.7) \times 10^{-6}$	--
Pasco, Kennewick, McNary Dam	beta	$(<0.05 \text{ to } 1.2) \times 10^{-6}$	--
Backwash Solids - Pasco Filter Plant	beta	7.0×10^{-2} µc/gm	+3
Backwash Liquids - Pasco Filter Plant	beta	1.1×10^{-6}	+2
Anthracite, Sand Filter - Pasco Filter Plant	beta	7.4×10^{-5} µc/gm	--
Other Waters and Related Materials			
300 Area Wells 1 and 3	alpha	$(<0.5 \text{ to } 4.6) \times 10^{-8}$	--
300 Area Well 4	alpha	6.5×10^{-8}	+2
Well 4 measured as Uranium	U	4.6×10^{-8}	+2
107 and 108 Wells	beta	$(<0.0005 \text{ to } 1.6) \times 10^{-4}$	-2
Other Wells on the Reservation	beta	$(<0.5 \text{ to } 1.8) \times 10^{-7}$	-2
Columbia River - Hanford Ferry	beta	2.3×10^{-5}	--
Columbia River - Below Reactors	beta	2.6×10^{-5}	+2
Columbia River - Paterson to McNary	beta	3.9×10^{-7}	--
Columbia River - Shore Mud	beta	$(0.13 \text{ to } 1.5) \times 10^{-4}$ µc/gm	+2
Raw Water - Operating Areas	beta	$(<0.005 \text{ to } 1.3) \times 10^{-5}$	--
Reactor Effluent Retention Basins to River	beta	8,900 to 20,900 µc/sec/reactor	--
		$(2.0 \text{ to } 4.4) \times 10^{-3}$	--
Reactor Effluent Retention Basins to River	alpha	<0.04 µc/sec/reactor	--
		$<5 \times 10^{-9}$	
I-131 in Farm Wastes to River	I-131	4.4 µc/day	-3
		6.8×10^{-8}	-3
I-131 in Columbia River - Hanford	I-131	4.1×10^{-8}	+2
300 Area Pond Inlet	alpha	1.0×10^{-6}	--

DECLASSIFIED

Radiological Sciences Department

Sample Type and Location	Activity Type	Average Activity Density µc/ml	Trend* Factor
Atmospheric Pollution			
Gross Alpha Emitters	alpha	(<0.4 to 1.1) x 10^{-14}	--
Gross Dose Rate - Separations Areas	beta - gamma	(0.6 to 5.1) mrad/day	--
Gross Dose Rate - Residential Areas	beta - gamma	(4.0 to 10.1) mrad/day	+2
Active Particles - Separations Areas	beta	(0.17 to 1.5) x 10^{-12}	-3
I-131 Separations Areas	I-131	(0.3 to 1.5) x 10^{-13}	--
I-131 Separations Stacks	I-131	0.30 curie/day	-2
Ruthenium - Separations Stacks	$Ru^{103-106}$	<0.01 curie/day	--
Active Particles - Wash., Idaho, Ore., Mont.	--	0.005 to 0.044 ptle/m^3	--
Active Particles - Project	--	0.003 to 0.037 ptle/m^3	-3
Tritium (as oxides) - Reactor Stacks	T	2.0 curies/day	+2
Vegetation			
Environs of Separations Areas	I-131	(<3 to 4) x 10^{-6} µc/gm	--
Residential Areas	I-131	(<3 to 3.1) x 10^{-6} µc/gm	--
Eastern Washington and Oregon	I-131	(<0.3 to 1.3) x 10^{-5} µc/gm	+4
Non-Volatile Beta Emitters Wash. and Ore.	beta	(0.43 to 4.4) x 10^{-4} µc/gm	+3
Alpha Emitters - Separations Areas	alpha	(0.3 to 2.5) x 10^{-6} µc/gm	--

*The trend factor shows the n-fold increase (+) or decrease (-) from last month, where values of n less than 2 will not be noted.

DECLASSIFIED

DECLASSIFIED

FINANCIAL DEPARTMENT MONTHLY REPORT
MARCH, 1956

Notification was received that Supplemental Agreement No. 33 to the prime contract with the Atomic Energy Commission was executed on March 9. Although agreement had been obtained from the AEC to continue in effect all applicable authorizations and approvals obtained prior to that date, work which had been under way for some time toward meeting the necessary requirements as provided in the supplemental agreement was accelerated. The preparation of documents to implement the revised contract was a major project of the General Accounting Section in March. It is anticipated that all approvals which must be up-dated will be submitted to the Commission by the end of April.

By an agreement with the Commission in March, nonreimbursable expenses of $25,202 incurred in connection with the negotiation of Supplemental Agreement No. 33 were charged to the overhead allowance. KAPL's expenses for this purpose were $16,965. Other nonreimbursable charges from HAPO totaled $3,795, as follows:

Conference expense	$2 328
Travel and living expense variation	882
Cost of preparing special report relating to G.E.'s commercial business	316
Nonreimbursable transfer expense	245
Telephone charges	24
	$3 795

Revisions to the travel and living expense variation budget have been completed to incorporate the increase of $1 in the per diem reimbursement from the AEC under the revised contract.

An eleven-year du Pont-GE record of freedom from rail transportation accidents involving off-site shipments of SS materials from Hanford terminated with the derailment of a train March 24 at St. Marys, Idaho, due to a snow-slide. Included in the derailed and damaged material was a carload of regular normal uranium solid scrap shipped from this site on a Government bill of lading to the National Lead Company of Ohio. Services at the site of the wreck, provided by employees of the Metal Preparation Section, resulted in the recovery of all but two test eggs and approximately 80 pounds of scrap. The material was reboxed at St. Marys and reshipped within six days. Approximately 600 empty wooden slug containers were destroyed at the wreck site.

A policy of refunding electrical meter deposits to customers who have established a record of satisfactory payments over a period of a year has been proposed by the Richland Electrical Unit, approved by the Commission on April 4, and will be put into effect in April by the Accounts Receivable Unit.

[redacted]

A report by the Property Accounting Section on the results of the annual physical inventories of electrical, maintenance and telephone materials on 33 service trucks disclosed a combined overage of $69. The total value of materials inventoried was $9,430. Physical inventories of coal and fuel oil in the custody of the Manufacturing Department and the Auxiliary Operations and Plant Protection Section were taken during the month.

The balance in unclassified property subaccounts was reduced from $10,704,000 to $560,000 during March. This reduction resulted from the complete unitization of twelve construction projects and the transfer of these costs to classified property accounts.

A revision to Volume 1000 of the AEC Manual was issued during March containing standard service lives, depreciation rates, and depreciation principles. A number of changes have been made in the basic depreciation procedures of the Commission and a number of the points that were recommended in document HW-34278, "Hanford Depreciation and Obsolescence Recommendation," have been incorporated in the new instruction. The new rates will be placed in effect on July 1, 1956.

Thirty-nine requests for appropriations having a value of $454,561 were investigated and processed during the month. Fifteen project proposals and informal requests, representing an aggregate of $1,689,900, were reviewed, approved, and transmitted to the Commission. After receipt and analysis of AEC directives and work authorities, five project authorizations were issued for a total of $587,800.

The Plant and Equipment Projects Budget for FY 1958 and Revision for FY 1957, having been reviewed informally by the General Manager and Department Managers, is being prepared by the Contract Cost Section for submission to the HOO-AEC on or about April 20.

A suspense account has been established in which to accumulate stand-by costs resulting from the strike of the teamsters, operating engineers and cement finishers employed by the CPFF service contractor, the J. A. Jones Construction Company, which began on March 22. This will not include the costs incurred by other organizational components which are furnishing temporary employment for 42 of the 78 nonexempt employees of G.E.'s Minor Construction Sub-Section.

An average daily patient census at Kadlec Hospital of 62.0 for March was higher than anticipated with a resulting improvement in the cost-budget relationship. It now appears that costs for the fiscal year will not exceed the budget despite lower than estimated census figures earlier in the year.

A special report on coal consumption for the calendar years 1952 through 1955 was prepared by the Contract Cost Section to comply with a request originating in the Washington Office of the AEC.

The February "Summary of Disbursements," transmitted to the AEC in March, showed net expenditures of $8,651,461, as follows:

Payrolls and payroll deductions disbursed	$4 318 598
Material (including orders placed on requirements contracts) and freight	2 393 334
Insurance, pension and taxes	2 195 506
Subcontracts and agreements	75 721
Advances for traveling and living expense	75 859
Miscellaneous	51 974
Gross Disbursements	9 110 992
Less: Revenue	459 531
Net Disbursements	$8 651 461

The Procedures and Computing Section completed one of the most complex scientific computer calculations performed at Hanford to date with a 25-hour run on the 702 Electronic Data Processing Machine. This problem, done to assist theoretical physicists in performing a new type of analysis on neutron diffusion, was initiated some two years ago and an attempt was made to solve the problem on the card-programmed-calculator. The processing speed of that machine made the solution impractical, and it was decided to hold the problem until installation of a high-speed machine. The speed of the 702 on this problem was greater than that of the former equipment by a factor of 25.

By the use of the 702, the results of the exempt salary review were summarized and required reports and statistical analyses prepared.

Conversion of weekly salary distribution from punched-card equipment to the 702 system has been completed. The last major program yet to be converted to the 702 is the classified document inventory control system.

Detailed reports for the Financial Department appear on succeeding pages, as follows:

Summary of Cash Disbursements, Receipts and Advances	I - 4
Auditing Section	I - 5
Budgets and Measurements Section	I - 6
Contract Cost Section	I - 7 through I - 11
General Accounting Section	I - 12 through I - 19
Personnel Accounting Section	I - 20 through I - 22
Procedures and Computing Section	I - 23 through I - 30
Property Accounting Section	I - 31 through I - 35
SS Accountability Section	I - 36 through I - 38
Personnel and Organization Statistics	I - 39 through I - 40

SUMMARY OF CASH DISBURSEMENTS, RECEIPTS AND ADVANCES

A summary of cash disbursements and receipts (excluding advances by the Atomic Energy Commission of $7,100,000 for March and $9,004,212 for February) for the months of March, and February, 1956 is shown below:

Disbursements	March	February
Payrolls (net)	$3 740 121	$3 209 540
Materials and Freight	2 278 414	1 980 061
Payroll Taxes	767 596	780 998
Payments to Subcontractors	621 388	488 994
Stock Bonus Plan—Employer's Portion Year 1955	247 206	-0-
Group Insurance Premium	232 207	232 113
United States Savings Bonds	154 382	226 216
Travel Advances to Employees	80 270	75 859
Pension Plan—Employees' Portion	23 777	32 221
Pension Plan—Employer's Portion Year 1955	-0-	1 954 766
All Other	210 991	130 224
Total	8 356 352	9 110 992
Receipts		
Sales to AEC Cost-type Contractors	122 805	107 218
Rent	109 095	108 923
Electricity	105 316	92 420
Hospital	63 476	36 725
Telephone	59 382	60 205
Sundry Accounts Receivable	22 203	25 062
Refund of Travel Advances to Employees	12 427	12 644
Bus Fares	9 828	9 837
Refunds from Vendors	1 163	721
Other	13 623	5 776
Total	519 318	459 531
Net Disbursements	$7 837 034	$8 651 461

Outstanding advances as of March 31, and February 29, 1956 were as follows:

	March	February
Cash in Bank - Contract Accounts	$1 691 254	$2 428 288
Cash in Bank - Salary Accounts	20 000	20 000
Total	$1 711 254	$2 448 288

AUDITING SECTION
Monthly Report - March 1956

A report was issued for the audit of Management of Capital Assets.

At month-end a report was being prepared for the audit of Accounts Receivable.

Field work was continued on the following audits:

Stores Activities
Procurement Activities
Accounts Payable

An audit of Weekly Payroll and Timekeeping was started during the month.

Follow-ups were made to determine the extent of compliance with recommendations in reports of the following audits:

Material and Package Passes
Employee Awards and Recognition Plans

Two employee information meetings, both of which included safety subjects, were held during the month.

Effective April 1, Richard E. Middaugh of Contract Cost Section and Donald W. Semmern of Budgets and Measurements Section will transfer to Auditing Section as Semi-Senior Auditors. On April 27 John R. Elliott will transfer from Auditing Section to the International General Electric Company Division for internal audit work in Rio de Janeiro, Brazil.

BUDGETS AND MEASUREMENTS SECTION
MONTHLY REPORT - MARCH, 1956

General

A suggestion award in the amount of $45.00 was approved to a Financial Department, General Accounting Section, employee.

The Manager - Budgets and Measurements Section visited the University of Washington, Seattle University, and College of Puget Sound to recruit financial personnel. Results appear to be very successful.

Particular attention continued on safety education and instruction. Complete safety and housekeeping inspections were made. Nonexempt employees attended one formal safety meeting, while all exempt employees discussed emphasis on safety at each of four staff meetings held during the period by the Section Manager. Job Hazard Breakdowns were prepared for clerical workers and for operation of the ditto machine and were approved by the Safety Engineer. All employees have been required to read and sign. Arrangements were made to remove all hazards connected with the ditto machine by installation of new lights and a ventilation fan.

Budgets

Revised FY 1956 Financial Plan was received from HOO-AEC on March 1, 1956, and a reconciliation with current bogey estimates indicates the need for additional funds in some instances. HOO-AEC has requested additional funds for production costs, inventory level and fee provision.

Budgeted inventory requirements for FY 1957 and FY 1958 were completed on March 21, and a review letter has been prepared for Manager - Finance. Similar letters are being completed for Equipment Not Included in Construction Projects and Community (7000) Program, with an explanation of major changes.

Some delays in budget preparation have resulted from changes in assumptions regarding programs, particularly for Research and Development programs.

Several meetings with HOO-AEC and Washington AEC personnel were attended by our personnel. Purpose of the meetings was primarily to create a better understanding of problems encountered in selling the HOO story to Washington.

Employee and Public Relations Cost Unit

A reallocation of construction funds for the Community Program was developed and approved by the department manager. The reallocation did not affect the total amount allocated to General Electric for Community Program work and was necessary following a re-evaluation of the needs of this program for the balance of the year.

A study of future reporting requirements for the Community Cost Sub-Unit was completed and the recommendations of the supervisor discussed with interested AEC people, and a report was issued to the Manager - Contract Cost Section. Although certain minimum requirements of the Commission must still be met, we expect to substantially reduce the work load and subsequently make most of the personnel of this Sub-Unit available for transfer to other work. No changes are contemplated until after the beginning of the next fiscal year.

The average daily census at the hospital for the month of March will be approximately 62.0. This is a much higher figure than anticipated in the budget and further improvement in the cost-budget relationship is expected. At this point it appears likely that this activity will complete the fiscal year within the budget allowance.

Two special studies were conducted during the month. One was requested by Dr. W. D. Norwood for converting operating costs to a calendar year basis for calendar year 1955, and working papers were developed to supply other information as requested. A separate study was requested by Dr. P. A. Fuqua which developed estimated space rental costs in connection with a proposed move of certain Industrial Medical operations to the Medical Dental Building.

Cost ledgers were revised during the month to facilitate posting and reporting following recommendations made during a recent audit. This will require some additional time in posting, but this will be more than offset by time saved in report preparation and analysis.

Engineering Cost Unit

On March 22, 1956, the Teamsters, Operating Engineers and Cement Finishers employed by the CPFF Service Contractor, J. A. Jones, went out on strike in dispute over travel agreements. As a result of this strike all construction work performed under Minor Construction was stopped. On March 23, 1956, 78 General Electric non-exempt employees in Minor Construction were given furlough notices effective March 30, 1956. However, before furloughs became effective, 42 of these employees were employed on a temporary basis by other departments and sections. A suspense account has been established to accumulate those standby costs resulting from the strike. This account will be closed before the end of the fiscal year by redistribution of reserves or overliquidations.

Some of the crafts employed in the Fabricating Shops have returned to work -- Boilermakers on March 29, Machinists and Ironworkers on April 2. However, work they can perform is limited to materials available in the Shops and that work that can be performed without Operating Engineers for lifting equipment.

Engineering Cost Unit (Continued)

General Electric nonexempt employees in Minor Construction for the week March 26 through March 30 were used to conduct a physical inventory of Minor Construction Small Tools. Physical count was completed March 30, 1956, and consolidation and pricing started. Consolidation and pricing will be completed when the nonexempt employees are recalled.

Physical Inventory of Minor Construction Miscellaneous Stores Captions 117 - Electrical Supplies and 132 - Insulating Materials scheduled April 2 were cancelled as a result of the strike and will be rescheduled.

Effective with the reports for week ending April 4, the weekly summary project reports were issued on the new ozalid form. This report now reflects the combined information previously reported in separate reports by Engineering Cost and Project Cost Services Unit and has resulted in advancing issue date by one day for Engineering Cost and two days for Project Cost Services Unit.

On March 2, 1956, Supervisor - Project Cost attended a meeting with Estimating Unit of Project Services Sub-Section and explained the source and distribution of cost to the 700 and 800 accounts within projects.

Reserves for Minor Construction equipment were at the following percentages of acquisition cost as of February 29:

Major Equipment	81.46%
Shop Equipment	82.19%
Small Tools	50.08%

In view of these percentages, consideration is being given to discontinuing or reducing the depreciation accrual for Shop Equipment effective April 1. Accrual of depreciation for Major Equipment was discontinued on June 1, 1955. A complete review of Minor Construction Major Equipment has been completed and property record cards are now being prepared. Review of Minor Construction Shop Equipment is underway with target date of April 15 for completion.

Completion of the Engineering Department Operating Budget has been delayed due to last minute changes required by the receipt of additional assumptions from HOO-AEC. Personnel, materials, services, etc., will be increased slightly in order to provide additional services to the University of California Radiation Laboratory, and the addition of 4000 Program - Reactor Development work.

The Plant and Equipment Projects Budget for FY 1958 and Revision for FY 1957 has been reviewed informally by the General Manager and Department Managers. The formal budget package is being prepared and should be ready for submission to HOO-AEC on or about April 20, 1956.

Work Authority AEC-151-B dated November 30, 1955, authorized General Electric to incur cost up to $180,000 to perform Advance Engineering studies to support the FY 1958 Plant and Equipment Budget. Through week ending April 1, 1956, the total cost incurred in support of this work amounted to $107,734. To date varying amounts of Engineering effort have been expended on approximately 55 different studies of which 25 have been temporarily approved for submission to HOO-AEC. Data sheets are being formalized on these potential projects which have an estimated cost of $54.5 million.

Engineering Cost Unit (Continued)

A request has been initiated by the Engineering Department to have Project CA-512, 100-K Area Facilities, finance six ribless zirconium process tubes in conjunction with the 1706-KER Facility. Four of these tubes will be installed in the KE Pile and the other two will be used for spares and mockups. Estimated cost of the six tubes is $36,000.

A schedule of operating cost and budget data relative to 2000 and 3000 Research and Development Programs was prepared for the Engineering Department for incorporation in the "Proposal for Research and Development Program, Fiscal Years 1957 and 1958."

General and Consolidations Cost Unit

Operating Budget submissions were completed in March, and the appropriate number of copies together with budget justifications were given to the Budgets and Measurements Section.

A new report was issued covering February costs entitled "Procedures and Computing Section - Performance Against Work Order Standards" (2143). This report detailed performance of Procedures and Computing Section against standards established for routine work orders. The majority of these work orders are chargeable to Financial. Covered by the report was October through February, 1956. Subsequent reports will show current month and fiscal year to date performance.

The new IME and 702 billing rates were established for Procedures and Computing Section. A reduction in 702 billing rate from $250 per machine-hour to $210 is effective with March billing. Several reductions of the IME of the individual units are effective with April billing. The purpose of these reductions was to lower Procedures and Computing Section revenue in order to approximately equate revenue with costs for FY 1956.

In addition, arrangements were made to make billings between units of the Procedures and Computing Section on a cost basis. This measure will avoid artificial inflation of unit costs and make the true revenue of each Procedures and Computing unit apparent on the operating reports.

Special reconciliations of Procedures and Computing charges to Manufacturing and Engineering were prepared for the Cost unit servicing these departments.

The yearly study calculating overhead distribution for FY 1957 between the Production, Research and Development, and Protection of Plant and Personnel was completed and issued.

Manufacturing Cost Unit

A major activity during the month centered around the final preparation and review of the FY 1957 and FY 1958 budgets. A rough draft comparison was prepared for FY 1957 (eight months actual plus four months bogey) and the FY 1957 budget. Unit costs for the budget indicate a continued reduction although total cost will be considerably higher.

A comparison of HAPO unit costs and Savannah River was begun and a preliminary report issued in TS Document XX-1566. HAPO unit costs compared favorably for the period reviewed.

Manufacturing Cost Unit (Continued)

In accordance with the Reactor Section's request to eliminate overtime, two reports were issued to Reactor Section supervision during the month of March. These reports were:

1. Overtime hours worked by week ending date and unit code. This report was issued to all Reactor Section supervision.

2. Schedule of overtime hours worked by each Maintenance Unit detailed by work order or expense account charged for overtime. This report was issued to the Maintenance Sub-Section superintendents and will be continued to be issued on a monthly basis since it supplies maintenance with pertinent information as to why and where overtime is being worked.

A graphic illustration of Reactor Section's overtime experience during the past two years was prepared for the March Cost Meeting. This chart pointed out the trend of overtime hours, equivalent man units of overtime worked, the percentage of available hours used, the balance of hours remaining in the first calendar quarter request and the cost of overtime to the Reactor Section.

Revisions of the Reactor Section Standard Cost Manual were completed. Maintenance, salary and essential material standards were revised to reflect changes in standard crews, tube replacement activity and essential material consumption.

Revision of the Reactor Section Maintenance coding system was undertaken. A draft of a procedure was routed to the Reactor Areas Maintenance Sub-Section for comments. This procedure covers the application of work requests, expense codes, cross orders and work orders within the section and is designed to tighten up the authorization of work to be performed by Reactor Maintenance.

At the request of the Redox Plant Superintendent, the Financial Representative for Separations Section conducted a cost meeting with Redox personnel. This meeting was designed to familiarize Redox personnel with all costs associated with their facility, the method of accumulating these costs and possible means of reducing these costs. This meeting will be held on a regular basis each month.

The Supervisor of Budgets and Control held two meetings with Separations personnel in order to explain the present interpretation and effect of the revised OPG 04.6, "Capital Plant and Equipment Accounting and Control" on field records and procedures.

The responsibility for presenting the cost analysis in the monthly cost meetings for Metal Preparation Section has been assigned to the Financial Representative. In the past the Manager - Metal Preparation Section has conducted the Section cost meetings.

A new ledger system, using peg-board paper, will be put into effect during the month of April. Considerable preparatory work has been accomplished by a minor test run. One unit from each section was chosen as most representative of the problems of that section and February costs were posted to the peg-board sheets. Several group meetings will be held to insure complete understanding of the new system. It is expected that time will be saved after the first or second month of operation.

Manufacturing Cost Unit (Continued)

A meeting was held on March 21 with personnel of AEC and Pile Technology Unit to discuss the Air Force Special Request Program. The Air Force had requested a detailed account of all the cost incurred in somewhat the same form as we are now reporting to University of California Radiation Laboratory. This would have caused a considerable amount of extra work, and it was our recommendation that the detail be held at a minimum for billing to the Air Force. Unless directed by AEC, it is not planned to make any changes in our method of billing; however, we did agree to segregate cost between equipment installation and operation. This will be accomplished merely by issuing separate codes for cost accumulation.

Physical inventory of essential materials was witnessed at 100-D and 100-H during March. In addition, the survey of the coal piles in 100-B and 100-F was observed in connection with the current physical inventory being performed by Inventory Accounting personnel.

A special report on coal consumption for calendar years 1952 through 1955 was prepared in connection with a request for information originating in the Washington AEC office. This request came through Budgets and Measurements personnel.

A report comparing Passenger Sedan Rental rates at HAPO with Hertz Service and Associated General Contractors was prepared. Findings indicated that HAPO rates compared favorably to both Hertz and Associated General Contractors.

Effective with March business, process car movements will be booked through month end. Formerly, process cars cut off on or about the 25th of the month. A more up to date and accurate distribution of costs should result from this change.

At the request of the Stores Sub-Section, a report detailing General Supplies Warehousing costs was prepared to indicate what portion of the current liquidation percentage is attributable to the major items of overhead.

A cost clerk has been assigned to Stores for the purpose of checking unit of measure, pricing, coordinating IBM runs, and processing corrections. Considerable time has been spent in outlining this work and reaching agreement with Stores Supervisor on the specific duties to be performed by the clerk.

Three employees were loaned to Engineering Cost for two days in connection with the physical inventory of Minor Construction small tools.

GENERAL ACCOUNTING SECTION
MONTHLY REPORT - MARCH, 1956

ACCOUNTS PAYABLE UNIT

The number of vouchers processed in the Accounts Payable Unit during March reached a new high level of 5,325, which is the greatest number recorded in any one month since March of 1951 (5,345). At that time Accounts Payable functions were processed by four separate groups with the volume for each group as follows: Manufacturing - 1,001 vouchers (8 employees); Community - 371 vouchers (2 employees); Engineering - 1,396 vouchers (25 employees); and General - 2,577 vouchers (16 employees); total vouchers processed - 5,345, total personnel - 51.

Activity in the Freight Account increased slightly over February. During March, 1,762 bills amounting to $343,997 were paid as compared to the February total of 1,703 bills amounting to $304,396.

Cash discounts earned during March amounted to $11,500, while the fiscal year to date total was $75,966. The March figure was the highest in any one month in recent years.

Active contracts handled by Accounts Payable, excluding requirements contracts, numbered 45 and contract commitments at month end amounted to $589,046. Payments on these contracts during March were $77,165.

Orders placed on requirements contracts during March numbered 11 in the amount of $407,629 and commitments at month end totaled $839,247. Payments under requirements contract orders were $544,141.

Following is a resume of Accounts Payable statistics for March and February:

Accounts Payable:

	March	February
Balance at beginning of month	$ 673 059	$ 575 888
Vouchers entered	4 580 341	5 771 687
Cash receipts	1 163	721
	5 254 563	6 348 296
Less: Vouchers Paid	4 461 848	5 675 237
Balance at end of month	$ 792 715	$ 673 059
Number of vouchers recorded	5 325	4 532
Number of checks issued	3 049	2 841
Number of freight bills paid	1 762	1 703
Amount of freight bills paid	$ 343 997	$ 304 396
Number of purchase orders received	2 369	2 850
Amount of purchase orders received	$2 054 370	$1 739 478
Amount of cash discount earned	$ 11 500	$ 8 742

ACCOUNTS RECEIVABLE UNIT

The recently completed Accounts Receivable Procedures Manual was distributed to appropriate employees and the Atomic Energy Commission on March 28.

Discussions were completed between Accounts Receivable and the Richland Electrical Unit with respect to refunding electricity meter deposits to customers when they have established satisfactory payment records. A letter requesting approval for making such refunds was prepared by the Community Section and forwarded to the Atomic Energy Commission on March 23. It was approved on April 4. The formal procedure to be followed in refunding such deposits is presently being prepared.

Bills to commercial facilities for utilities were prepared by automatic posting machine for the first time this month. Utilization of this method of billing results in a saving of approximately eight man-hours as compared to the former method followed.

The gross accounts receivable balance at March 31 amounted to $375,989, a decrease of $40,513 when compared to the balance of $416,502 at February 29. This decrease results primarily from decreases of $11,014, $23,507, $5,485, and $22,533 respectively, in the Kadlec Hospital, electricity, telephone, and AEC cost-type contractors accounts, partially offset by increases of $19,247 and $2,268 in the sundry and rents accounts. Explanations of the more significant changes in balances are given below:

Kadlec Hospital - Increased cash receipts primarily explains the decrease reflected in this account. Cash receipts for the month amounted to $63,476 or an increase of $26,750 when compared to cash receipts for February. Payments from the Metropolitan Life Insurance Company amounted to $38,809, as compared to $10,406 for February. In-patient sales reflected a decrease as evidenced by the adult patient day census decreasing to 60.7, or a decrease of 10.2 when compared to the month of February.

Electricity - Cash receipts amounted to $106,499 as compared with $94,048 for February, and charges for electrical consumption decreased $32,064 when compared with February. The combination of these items results in the reflected decrease.

AEC Cost-Type Contractors - The decrease reflected in this account results from a combination of decreased billings and increased cash receipts when compared to the first two months of calendar year 1956.

Sundry - A billing to the General Electric Company of $25,201.60, representing nonreimbursable expenses incurred in connection with the revised contract, accounts for the increase of $19,247 reflected in this account.

Disconnect notices were mailed to 494 telephone subscribers, and the service of 18 subscribers was suspended due to nonpayment of bills. During the month, 539 delinquent notices and 121 final notices were mailed to electricity customers, while the service of five electricity customers was suspended due to nonpayment of bills.

Accounts Receivable statistics are summarized on the following page:

ACCOUNTS RECEIVABLE UNIT (Continued)

Account	Balance 2-29-56	Net Charges	Collections	Balance 3-31-56	Active Accounts
Kadlec Hospital					
Active	$100 974	$ 59 691	$ 70 442	$ 90 223	1 923
Collection Agencies (79 accounts)	7 956		263	7 693	
Electricity	62 070	82 992	106 499	38 563	3 850
Telephone	30 176	54 810	60 295	24 691	7 093
Sundry: Active	34 325	41 412	22 050	53 687	378
Collection Agencies (139 accounts -a)	8 611	161	276	8 496	
AEC Cost-Type Contractors	124 681	100 272	122 805	102 148	25
Rents	27 122	384 291	382 023	29 390	6 715
Equipment Sales to Facilities (1 account)	18 497		349	18 148	
Safety Shoes	1 663	3 676	3 393	1 946	394
Loans to Employees (4 accounts)	427	600	23	1 004	
Sub-Total	416 502	$727 905	$768 418	375 989	20 378
Reserve for Bad Debts	(35 434)			(35 962)	
General Ledger Balance	$381 068			$340 027	

(a- Includes all utility and rental accounts.

ADMINISTRATIVE PLANNING

A total of 28 new or revised organization and policy guides were issued during March. Of these, 13 were instruction or policy guides, and 15 were organization guides. In addition, 20 were in the process of duplication or distribution at the end of the month. The 13 instruction guides were as follows:

04.9 "Radiation Monitoring Instruments"
This instruction was revised to establish a clear statement of directive policy and to bring the procedure up-to-date.

06.1 "Legal and Financial Responsibility"
This policy guide was revised to modify the language of the policy statement slightly. No substantive changes were made.

06.3 "Compensation, Gifts or Gratuities from Vendors or Subcontractors"
This instruction was revised to make two slight modifications, without substantive changes, in two paragraphs of the policy statement.

06.5 "Handling Unsolicited Disclosures of Technical and Business Ideas"
This instruction was revised to bring nomenclature up-to-date and to change the address of the Submitted Ideas Unit.

09.1 "Monthly Report"
This instruction was revised to indicate the responsibility of department managers for the appropriateness of information included in monthly reports and to assign to the Technical Information Unit the responsibility for producing the plant monthly.

13.21 "Employee Service Recognition Plan"
This instruction was revised to make necessary nomenclature changes.

15.1.1 "Sensitive Positions"
This instruction was revised to make a clear statement of directive policy and also to clarify the procedure.

15.14 "Procurement of Classified Services or Material"
This instruction was revised to bring this 1951 guide up-to-date.

15.29 "Unlocked Classified Repositories and Improper Storage of Classified Material"
This instruction was revised to bring this 1951 guide up-to-date.

18.2 "Absences and Tardiness"
This instruction was revised to change the provisions regarding death of immediate relative, to add services as a political party official to "other personal reasons," to eliminate service requirement for jury duty, to amplify provisions regarding industrial injuries and to add provisions relating to blood donating.

19.4 "Notice of Labor Disputes"
This new instruction provides that notice must be given to HOO-AEC if a labor dispute delays or threatens to delay the performance of the work under the Prime Contract.

19.5 "Work Schedules"
This new instruction relates to the establishment of approved work schedules and the assignment of nonexempt employees to them.

24.6 "Radiation Hazard Disclosure"
This instruction was revised to establish a clear statement of directive policy.

The following organization and policy guides are currently being reviewed or revised:

02. "Control of Organization Structure"
04.1.1 "Performance of Project Work"
04.1.3 "Research and Development"
05.1 "Plant and Equipment Appropriations"
05.3.4.1 "Authorization for Work Performed by Battelle Memorial Institute"

ADMINISTRATIVE PLANNING (Continued)

05.4	"Reimbursement Authorizations and Requests"
12.1	"Reporting Inventions and Discoveries"
12.2	"Employee Patent and Confidential Information Agreement"
13.2	"Membership in Trade and Professional Societies or Associations"
13.5	"Disciplinary Action"
14.1	"Plant Evacuation"
14.2	"Hanford District Civil Defense"
14.3	"Use of Industrial Medical Services"
18.1	"Weekly Time Cards"
20.1	"Release of Information to the Public"
21.5	"Processing of Excess, Salvage and Scrap"
22.5	"Printing and Duplicating"

The following new organization and policy guides are being circulated for review and approval:

"Excavation Permits"
"Control of Hand Tools"
"Special Incident Reports"
"Organization Announcements"

Two complete OPG books were compiled and 556 extra copies distributed.

CONTRACT REIMBURSEMENTS

Word was received that Supplemental Agreement No. 33 to the prime contract with the AEC had been executed on March 9. Continuing with work begun several months ago, the Contract Reimbursements group concentrated during March on the examination of 485 letter approvals obtained from the Commission under the basic prime contract, with a view to resubmitting those which must be reapproved under the revised contract. These reviews, which entailed consultations with the departments affected to ascertain current conditions and with HAPO's attorneys with respect to contract interpretations, required considerable time, but a good part of this work was completed. The preparation of documents to meet new provisions under the revised contract was also accelerated.

The Commission approved the following costs as allowable under the prime contract:

1956 memberships in trade, civic, business and professional societies and associations costing $3090.

Expenses of Paul F. Gast for technical mission to United Kingdom.

Payment of recruiting expenses in connection with employees hired through GE's New York City Technical Recruiting Center.

Participation of selected HAPO employees in GE Professional Business Management Course.

CONTRACT REIMBURSEMENTS (Continued)

Salaries and travel expenses of HAPO personnel engaged in recovering special material involved in railroad accident

Requests for approvals by the Commission submitted during March on which we had received no advice as of March 31 were:

Permission to refund electrical meter deposits after one year to persons with satisfactory payment records. (Approved on April 4.)

Retention of special investigators in workmen's compensation case.

Attendance of chief pharmacist, Kadlec Hospital, at two-day refresher course in pharmacy.

The February "Summary of Disbursements," completed in March and transmitted to the Director of the HOO's Finance Division, showed net expenditures of $8,651,461, as follows:

Payrolls and payroll deductions disbursed	$4 318 598
Materials (including orders placed on requirements contracts) and freight	2 393 334
Insurance, pension and taxes	2 195 506
Subcontracts and agreements	75 721
Advances for traveling and living expense	75 859
Miscellaneous	51 974
Gross Disbursements	$9 110 992
Less: Revenue	459 531
Net Disbursements	$8 651 461

A settlement was reached by HAPO officials with the Commission on costs in connection with the negotiation of the revised prime contract which were to be considered nonreimbursable, and the overhead allowance was billed for $25,202 for such costs at Hanford. (KAPL's costs were fixed at $16,965.) Other nonreimbursable charges from HAPO totaled $3,795, as follows:

Conference expense	$2 328
Travel and living expense variation	882
Cost of preparing special report relating to GE's commercial business	316
Nonreimbursable transfer expense	245
Telephone charges	24
	$3 795

CONTRACT REIMBURSEMENTS (Continued)

The Contract Reimbursements group handled 23 inquiries on reimbursement matters during March, 13 of which originated in departments other than Financial.

One reimbursement auditor was transferred to the Engineering Cost Unit during the month, leaving the group with three auditors and two nonexempt employees.

GENERAL BOOKS UNIT

The travel and living expense variation budget for the fiscal year 1956 was revised during the month to reflect the increase in the amount allowed by the Commission from $9 to $10 in the per diem for living expenses, as provided for in Appendix B to Supplemental Agreement No. 33 to the Prime Contract, which was effective March 9. Other changes in the budget were also made which in effect, adjusted the budget to actual costs for the current fiscal year through March 8 and eliminated from departmental budgets, credit variations resulting from the travel of interviewees, new hires and transferred employees subsequent to March 8. The travel and living expense variation resulting from travel of transferred employees, new hires and interviews is not predictable, and this has caused the allocation of inappropriate amounts to departments. Travel of this type will be shown separately and not included in departmental amounts. Upon approval of the General Manager, the revised budget amounts will be shown on March reports.

The review and writing of operating procedures for work performed by the General Books Unit is nearing completion. The general ledger manual covering the purpose of and responsibility for general ledger accounts was released in March. A procedure for the recording and processing of travel, living, entertainment, and company-owned car expenses is nearing completion. Also, several revisions of forms for reporting the above costs are in process which will eliminate clerical work and improve controls. The review and revision of cash control procedures is currently under way which will complete the procedure write-ups for the General Books Unit.

A review of the procedure written by the Stores Sub-Section covering disposal of surplus equipment at an auction sale to be held April 23 was completed and recommended changes were forwarded to Stores to be included in the procedure. This procedure defines responsibilities, includes operating procedure and establishes basic controls in connection with the auction sale. A dress rehearsal is scheduled for April 10 to familiarize personnel with their responsibilities and functions in connection with the forthcoming sale.

A check for $8,097.53 was received March 15, covering the refund of the Washington State business and occupation tax paid by Fred J. Early Company, Inc., while a subcontractor of the General Electric Company. This tax, in the amounts of $3,859.50 and $3,260.00, respectively, were paid on Contract Nos. G-302 and G-367. These funds, which included a refund of principal totaling $7,119.50 and interest accrued totaling $978.03, were transferred to the AEC on March 20.

GENERAL BOOKS UNIT (Continued)

One of the highlights of the monthly health, safety and security meeting of the General Accounting Section was the presentation of a $45 suggestion award to a General Books employee for his suggestion leading to the revision of the procedure for recording and reporting of cash transactions.

Travel and living expense reports processed in March totaled 346, representing a gross expenditure of $70,754. These expenses and those for February are categorized as follows for comparative purposes:

	March	February
Travel and Living Expenses		
HAPO Business	$64 689	$59 806
Billed to Others	3 737	5 563
Conference Expense	2 328	2 280
Cost of Company-Owned Cars	-0-	17
	$70 754	$67 666

Following are other statistics for the month of March, along with the previous month's figures:

	March	February
Advances from AEC		
Balance at beginning of month	$ 2 448 288	$ 2 095 537
Advances received from AEC	7 100 000	9 004 212
Other cash receipts	519 318	459 531
	10 067 606	11 559 280
Less disbursements	8 356 352	9 110 992
Balance at end of month	$ 1 711 254	$ 2 448 288
Advances requested for subsequent month	$ 5 700 000*	$ 7 100 000
Travel and Living Expenses		
Travel Advances to employees		
Balance at beginning of month	$ 70 297	$ 74 747
Advanced to employees	80 281	75 859
	150 578	150 606
Less:		
Travel, living and conference expenses reported by employees	70 754	67 666
Cash refunded by employees	12 427	12 643
	83 181	80 309
Balance at end of month	$ 67 397	$ 70 297
Outstanding Travel Advances to Employees		
Current	$ 60 583	$ 59 752
Outstanding over 30 days	6 814	10 545
Total	$ 67 397	$ 70 297
Number of expense reports submitted by employees	346	344

* To be supplemented by $2,000,000 refund from the administrative fund during April.

PERSONNEL ACCOUNTING SECTION

MONTHLY REPORT - MARCH 1956

Meetings were held with supervisors of the Separations Section on March 7, 13 and 21 to explain the preferred method of completing weekly time cards before sending them to Payroll. These meetings were requested by the Separations Section. Two meetings were also held in February.

HAPO employees purchased U. S. Savings Bonds amounting to $2,072,569 through the Stock Bonus Plan during 1955. At the year-end, bonds amounting to $1,648,042 remained on deposit with the Company. The Stock Bonus applicable to these bonds, and which is contingently credited to participating employees accounts, amounts to $247,206.

Office Safety Rules for the Personnel Accounting Section were approved by the 700 Area Safety Engineer and copies were posted in all working spaces of the Section. All hazards observed during the Safety Inspection held on February 28 have been corrected or work orders placed to have them corrected. A Safety Inspection was conducted by the Manager, Property Accounting and the Manager, Personnel Accounting on March 28. Fire evacuation notices and fire drill procedures were discussed with all employees. All employees attended the Section Safety Meeting on March 27.

Forty-five Commercial Studies students from Columbia High School were escorted on a short tour of the Personnel Accounting Section. The tour arrangements were made by the Employee & Public Relations Department.

The AEC completed audit of the exempt Payroll during March. Formal report of the audit has not yet been received.

O.P.G. 18.1, entitled "Weekly Time Cards", was rewritten to include instructions for recent changes made in the time card. The rewritten draft was sent to Administrative Planning Unit for issue of the OPG.

A member of the Operations Research Synthesis Section met with Personnel Accounting representatives to discuss the possible methods and future plans for combining all personnel data for an employee into one file. At present, Personnel Accounting is continuing with plans to combine the information contained in Personnel Records and Payroll files. This does not interfere with the overall program being investigated by Operations Research & Synthesis Section, but will actually assist by providing a nucleus of information upon which to build.

General Electric Company representatives from the Idaho Test Station at Arco, Idaho visited to discuss administration of certain Payroll policies and practices. Of particular interest was our timekeeping practices in the outer areas.

Conversion work for processing exempt payroll on the 702 is continuing. Several mutual problems related to the conversion have been resolved with Procedures personnel. The new style checks and deposit slips for use on the 702 have been received.

STATISTICS

Personnel Accounting Section

Number of HAPO Employees	Total	Monthly Payroll	Weekly Payroll
Changes During Month			
Employees on Payroll at Beginning of Month	9 397	2 314	7 083
Additions and Transfers In	83	11	72
Removals and Transfers Out	(88)	(13)	(75)
Transfers from Weekly to Monthly Payroll		14	(14)
Transfers from Monthly to Weekly Payroll		-	-
Employees on Payroll at End of Month	9 392	2 326	7 066

Overtime Payments During Month	March Number	March Amount	February Number	February Amount
Weekly Paid Employees	8 257	$122 760-a)	7 501	$144 502-b)
Monthly Paid Employees	390	27 659	454	35 711
Total	8 647	$150 419	7 955	$180 213

Gross Payroll Paid During Month	March	February
Engineering	$ 844 486	$ 784 300
Manufacturing	3 079 045	2 626 696
Other	1 349 419	1 155 820
Total	$5 272 950-a)	$4 566 816-b)

(a- Payments to weekly paid employees are for five week periods.
(b- Payments to weekly paid employees are for four week periods.

Employee Benefit Plans	Number Participating		Percent Participation	
Participation in Benefit Plans at Month End	March	February	March	February
Pension Plan	8 530	8 396	98.8%	98.8%
Insurance Plan				
Personal Coverage	9 476	9 470	99.6	99.6
Dependent Coverage	6 737	6 726	-	-
U. S. Savings Bonds				
Stock Bonus Plan	5 091	5 077	54.2	54.0
Savings Plan	1 046	1 049	11.1	11.2
Both Plans	5 567	5 544	59.3	59.0

	March	February
Pension Plan		
Number retired	2	2
Number who became eligible for participation	195	88
Number who applied for participation	181	86
Number who elected not to participate	11	-
Replies not received	3	2
Insurance Plan - Number of Claim Payments		
Employee Life Insurance	4	2
Employee accident and health insurance	460	442
Dependent accident and health insurance	403	386
Total	867	830
Good Neighbor Fund		
Number participating	6 694	6 593
Percent of participation	71.3%	70.2%
Suggestion Awards		
Number of awards	140	41
Total amount of awards	$2 540	$1 580
Preferential Rates		
Number (eliminated) or added	(4)	-
Number currently in effect	480	484
Number of Military Allowance Payments	-	2

GENERAL

A tabulation of neutron collision density functions and probabilities was completed during the month with a 25-hour run on the 702. This work, done to assist theoretical physicists in performing a new type of analysis on neutron diffusion in Hanford-type reactors, was initiated some two years ago, and represents one of the most complex scientific calculations performed at Hanford to date. A small portion of the work was attempted on the card-programmed-calculator before it was decided to complete the job on the 702. In so doing, an increase in computing speed by a factor of 25 was realized, and the cost of processing cut more than one-half. The results of the calculation will be published.

The programming and data processing for the exempt salary review were completed as required. Two sets of reports were issued, the first showing the relationships of current wage and the new appraisals and the second showing the proposed wage changes. Also, a set of statistical figures was compiled to show the relationships of salary zone and level and appraisals.

K. R. Wright, Supervisor - Procedural Analysis Unit, attended an advanced financial seminar on Office Procedures, presented in Schenectady March 19 through 23. The seminar was conducted for General Electric Company supervision from various divisions and departments. Common problems and their solution were discussed; many of the solutions given will have application at Hanford.

PROCEDURAL ANALYSIS

Printing Orders Received in Forms Control		451
Items Ordered:		
Miscellaneous Forms	885,778	
IBM Card Forms	196,000	
Envelopes	30,000	
Total Quantity		1,111,778
Rejections:		
Printing Orders		14
Items		17,324
Orders Increased in Quantity		4
Orders Decreased in Quantity		1
Number of Forms Obsoleted		25
Number of Forms Designed and Revised		112

Work continued on the details of the system for converting monthly payroll procedures to EDPM operation. The basic input record formats were defined, including deductions, vouchers, adjustments, change and correction records; the varied output reports were designed, and the detailed problem logic was underway at month end.

The addition of a Billing Rate to the Office Machines Billing Report was made for the summary run at month-end. The calculated billing rate supplements the commercial rate previously listed in the summary, and will be used in assignment of costs to holders of office machines.

The revised report format for the weekly Overtime Report listing non-exempt overtime hours refused and worked was tested and successfully checked out in a parallel run for the week ending 3-25-56. Along with providing additional information concerning each employee listed, i.e., residence, phone number, and shift assignment, the new procedure provides for the combination of selected work classifications and organizations for the purposes of the overtime distribution.

Formats of reports to be produced in the proposed system were submitted to Property Accounting Section and reviewed in a conference with responsible personnel of that Section and a representative from AEC. Revised formats have now been prepared for final submission before programming. The programming write-up of the system has been reviewed with Computing Operations and additional data requested has been supplied. Several job requests have been written for processing and proof listing in connection with perfecting and balancing input which is being readied for conversion to the master tape record of the system.

Job Hazard Breakdowns were prepared on the offices, EAM rooms, Key Punch room, 702 machine room and the GE Records Center. A preliminary drawing was prepared for preparation of work order to eliminate safety hazard in wiring arrangement of key punch machines. A survey was made of file cabinets and card cabinets in Procedures and Computing Section to determine added requirements to meet safety regulations. A safety inspection was made of the EAM and 702 room facilities with L. G. West, Area Safety Engineer, and of the Procedures and Computing Section with the manager, H. Tellier.

An industrial engineering report on the key punch and verifying unit was distributed to all interested parties. This report was prepared to present a system for estimating the time to key punch data at this facility and to present the best methods of key punch and design that will facilitate key punching speed.

A work pattern or time distribution study was made of the Procedural Analysts for their personal evaluation and benefits.

The several passes to operate the daily business of the classified file are complete and, excluding restart procedures, are debugged. Parallel test operations were begun on March 31, 1956. It is anticipated that testing will continue through the next two to four weeks.

Meetings were held with Classified Files and Computing Scheduling employees defining controls, reports, input card forms, and pertinent operating procedures.

Work is continuing on the development of a system to control by machine the General Supplies inventory. Planning was completed for machine processing of the Excess physical inventory. The necessary EAM and 702 instructions have been written and actual processing will take place in April. Planning has been started on a procedure to process, by machine, issues from Minor Construction inventory.

Procedures were written for the processing of the following punched card special requests during the month:

1. Cards and a list were prepared for Benefit Plans Unit for non-exempt employees' pension contributions and gross pay for 1955.

2. A listing was prepared as requested by Employee Services for designated job classifications according to organization.

3. Stickers were printed for Benefit Plans Unit for exempt employees who were not participating in the GE Savings and Stock Bonus Plan.

4. Stickers were printed on all non-exempt employees by pay number within Section and Department.

5. Three lists of non-exempt employees were prepared according to job classification as requested by Personnel Practices. The employees' names, pay numbers, and job classifications were listed according to check location.

6. Various statistics and a combined history and proposed change report were prepared covering the 1956 Salary Review.

7. A procedure for the preparation of salary administration data cards, as requested by Employee Services Division, was completed and submitted to Computing Operations.

The first 702 "Quarterly Weighted Average Rates" reports were generated and submitted to Payroll Records Unit.

Four hours of instructions were given to Control Group on 702 payroll operations. Concentration was made on the calculation pass, with emphasis on how control amounts and messages were generated.

The logic work of revising the 702 calculation pass was started. Revisions will consist of: (a) Calculation of insurance to put the shift factor on a current week basis. (b) Revision of pension calculation to provide for year-to-date Pension Gross limit. (c) Excludable earnings will be calculated and a year-to-date amount will be reported, along with current calculations, to payroll in order to determine taxable wages on terminating employees.

Detail logic charts were completed for the program to build up year-to-date pension, and excludable earnings from payroll week ending January 1, 1956.

RECORDS OPERATIONS

Quantity of Records Received, processed and stored:

Employee and Public Relations Department	65	Standard	Storage	Cartons
Engineering Department	89	"	"	"
Financial Department	161	"	"	"
Manufacturing Department	134	"	"	"
Radiological Sciences Department	4	"	"	"
	453			

Records Retention and Disposal Schedule Number 227, "Metal Preparation Projects and Personnel Development Records" consisting of 20 individual records was submitted for internal approval. Records Retention and Disposal Schedule Number 224, "Separations Project and Personnel Development Records" consisting of 32 individual records, Records Retention and Disposal Schedule Number 225, "Separations Analytical Control Records" consisting of 22 individual records and Records Retention and Disposal Schedule Number 227, "Metal Preparation Projects and Personnel Development Records Consisting of 20 individual records were submitted to the Atomic Energy Commission for approval.

During the month, an additional rotational trainee was assigned to the Numerical Analysis Unit, and a technologist hired, effective 3-19-56.

Testing of the Special Request Exposure calculation program is nearing completion. One set of data for creating master records has been received. Upon receipt of the second, the first test runs will be made. A meeting was held with the customers to establish the form of input data.

Cost estimates for processing reactor data under the reactivity accounting program have been drawn up. If accepted, present plans call for processing between 3 and 12 sets of data per reactor for all reactors over a three-month period.

Further investigation into converting all or part of the 200 Areas Separations data processing to the 702 have been made. The primary impetus for this investigation came from the desire to mechanize the SS Accountability function in this area of activity. Since the initial investigation, however, it has become apparent that the Accountability function is necessarily closely tied to operations, and any 702 service performed for the former would probably have to meet the requirements of the latter. Investigation into the feasibility of extending this service to operations, particularly in the TBP-U03 facility, are under way.

Work on the conversion of the wind station data processing study to the 702 has been started. The new program will be considerably expanded, and consist of four phases: Editing all data accumulated to date, correcting errors and supplying missing data, converting all data records to a single format, and preparing summary tables similar to those planned for the meteorological study. All data cards punched in the past have been located and will be transcribed to magnetic tape preparatory to editing. In addition to summarizing all past data, the program will be used to process future data on a routine basis. Five years' meteorological data, contained in ten magnetic tape reels, have been sorted and are presently being edited. The last of the table-preparing routines has been written.

The tabulation of neutron collision density functions and probabilities was completed during the month with a 25-hour run on the 702. This work, done to assist theoretical physicists in analysis of neutron diffusion, was initiated some two years ago, and represents one of the most complex scientific calculations performed at Hanford to date. A small portion of the work was attempted on the card-programmed-calculator before it was decided to complete the job on the 702. In so doing, an increase in computing speed by a factor of 25 was realized, and the cost of processing cut by some $10,000. Certain calculations incidental to the main calculation remain to be done. Also, several attempts have been made to overcome singularity trouble in the calculation of the cosine-squared density function. Results as yet are inconclusive.

Preliminary results of the calculation of resonance escape probability have been obtained and reviewed with care. Certain anomalies in calculated cross section values were noted and attributed to the method used for obtaining the first and second partial derivatives of a two-dimensional tabular function. Originally these derivatives were obtained by the crudest method possible felt to be consistent with the accuracy of the tabular function. Later, this method was refined to obtain more accurate values of the derivatives in the neighborhood of rapidly varying functional values. The latest results have revealed that this refinement will not be adequate, inasmuch as the rapidly varying region of the table moves around as different cases are treated. A further refinement has been devised, and a portion of the 702 program re-coded to incorporate it.

The determination of fuel mixture to make a certain test reactor assembly critical has been undertaken. The problem requires the stepwise solution of a first order linear differential equation in which the slowing-down density of neutrons is expressed as a function of neutron lethargy. From the solution it is possible to determine the concentration of certain fuel elements to make the assembly critical. Some 14 parameters, including absorption, scattering, and fusion cross sections for approximately 200 values of lethargy, are to be treated. Programming is 50% complete. In order to minimize machine time, fixed-decimal coding is being used throughout.

A request to calculate the Bessel functions K and I for orders zero through three has been delayed somewhat due to the inadequacy of the existing subroutines to produce sufficiently accurate values. Appropriate asymptotic expansions are now being programmed to circumvent the difficulty. A number of requests for the solution of simultaneous equations were received and filled, using existing programs from the development library.

Cross section data relative to the calculation of non-linear isotope buildup have been received, and are now being key punched. The program, which was written by a representative of the Advanced Engineering Section, is now being reviewed and will be submitted for 702 debugging in the near future.

Numerical results have been obtained in connection with the problem of minimizing production costs with respect to reactor design and operating variables. Curve fits were completed and programmed. Certain changes in the original formulation were necessary to avoid the repeated use of the cell reactivity code in iterating to the optimum solution. Instead, the cross section values used in the cell reactivity calculation, which have a slight dependence on certain of the iterated variables, were calculated only once for the best estimate of these variables. Using this method, 48 cases were run to yield production costs. An additional 50 cases were also run, using a modified form of the curve fits.

A number of modifications were made to the delayed neutron groups study program, and the program put into 702 production. A total of 110 cases were run, each involving the determination of the roots of a seventh-degree transcendental equation, and subsequent evaluation of an expression in which the roots appear as parameters. The quantities calculated were flux ratios which will be used in reactor design analysis.

A calculation was made of the heat generating capacity of waste material stored in tanks following the separation process. Taking into account the irradiation history of the material, the heat generating capacity of fifteen unstable isotopes was calculated. Some 2000 cases in all were run.

Additional computation of temperature-dependent stresses in a Hanford slug was performed. The time and radial variation of stresses and other associated quantities in a solid cylinder was calculated out to twelve hours, for both a low temperature and a high temperature situation. At one point the method proved numerically unstable, and was successfully corrected by minor changes in logic. The same work for a hollow cylinder is almost ready for the 702.

A more general version of the calculation of slug temperatures in a runaway reactor has been written, tested, and run for a variety of initial conditions. The new version allows for a more general expression of the heat source function,

and for the evaluation of temperatures at the center, surface, and 5 intermediate points in the slug, as well as at numerous points in time out to three minutes. Frequent use of the program is anticipated in filling future requests.

Additional work was done in connection with a statistical study of sonic orientations in fuel elements. Certain modifications to the original program which generated sums and sums of squares of three variables have been made; these include the calculation of frequency distributions. Some 1350 cases will be run.

A program to calculate the optimum outlet temperature in a reactor from the standpoint of slug rupture was written, tested, and run during the month. Some twelve different parameters, representing conditions at different reactors and different operating procedures at a given reactor, were allowed to vary independently. A total of 1320 cases were run, each requiring the solution of a transcendental equation. Approximately one and one-half hours 702 time were required.

Work on the tube wall thickness program is continuing. The estimation of corrosion parameters has been completed for one reactor, with tentative indications that one of the parameters, the doubling temperature, is quite unimportant in the calculation of corrosion. A special editing routine had to be written, due to the relatively poor condition of data, and errors thus located are now being corrected. A further delay was introduced by a last minute change in program logic, necessitated by special features of two reactors. Programming of the tube wall thickness calculation is 90% complete. Additional work on corrosion consisted of the processing of one set of data under the program for corrosion rate of samples, and four sets of data under the average corrosion temperature program.

Further work was done on an analysis of stainless steel corrosion, consisting mostly of the manual correction of data. The 702 work, consisting of calculating sums and sums of squares, will be done using a standard library routine, and is presently scheduled for the middle of April.

COMPUTING OPERATIONS

During March, two tabulating machine operators terminated and an engineering assistant was added to the staff. The operators from the punched card machine room and the 702 room are now on a revolving schedule, giving all operators an opportunity to learn all the equipment, in order to obtain a better evaluation for permanent assignment.

Two technical graduates joined the section during March and are receiving basic 702 training. Additional training sessions were held for Control people in the Computing Scheduling Unit. Three sessions were spent discussing the weekly payroll application.

Tours of the 713 Building were conducted for 100 students from Columbia High School in Richland and for 25 students from Sunnyside High School.

Material for a comprehensive programming manual is being compiled and will be made available soon. The manual will contain all essential information required for the preparation of 702 programs and will undergo continuous revision as future development work is completed.

A preliminary manual is being prepared for the new automatic programming system. The manual will be completed several months before the system itself. This will enable changes and additional features to be included during the original development. It is anticipated that many suggestions will be received as a result of this preliminary description. In an attempt to speed up the development of the new system, certain portions of it are being assigned to other persons in the Section. The first of these assignments was recently made and will require a thorough study of automatic 702 restart procedures which will ultimately be a subroutine in the new system.

Emphasis has been toward cutting down on the expense and increasing the accuracy of running Weekly W/O Cost on the 702. All known errors have been corrected and a listing showing these errors has been forwarded to the cost units. The running time has been decreased on the weekly cost reports by at least 1 hour.

The month-end work order cost passes were processed on the 702 and distributed to the customers for the first time during the first week of March. Two of the 4 month-end passes have been reassembled and are now on file in the 702 room. All operator instruction sheets have been rewritten together with current flow charts and memory maps.

When processing pass 6 of the month-end procedure, it was found that the volume of the output was much larger than expected. When this output was used as input to a necessary sort, it required 9 hours of machine time and 1 sequence error still existed in the file. This pass has been revised so as to be able to sort the output in shorter segments and thus eliminate the risk of machine loss during such a long continuous period of machine time. The total sorting time required by the revision will actually be somewhat more than 9 hours, but will be more dependable and easier to schedule. This pass 6 was also revised so that the card reader is no longer required as an input unit.

A weekly payroll control pass, giving various counts and totals from a point midway in processing the weekly payroll, was completed early this month and is now in use. It has proven to be very helpful in balancing the weekly payroll as well as in detecting errors at an earlier point in processing the weekly payroll.

Preliminary planning, coding, and assembly of the statistical reports of weekly payroll have been completed. This new revision incorporates five reports into two, and also includes several items not previously reported.

Conversion of Weekly Salary Distribution from punched card equipment to the 702 system was completed during March. This program was tested by means of a production run parallel to that presently performed on the EAM equipment. The output of this program consisted of the weekly Premium and Allowance, Regular Earnings and Salary Distribution reports and also the labor detail input for the present Work Order Cost EDPM program.

The revised reports for Overtime Hours Paid have been tested with data for week ending 3-25-56. Corrections have been made and a complete parallel run will be made with this data checking the new reports against reports issued 3-27-56. If these results prove satisfactory, the revised reports will be distributed April 3, 1956 to all units which have requested these reports.

The Office Machines Repair report was revised to include a Billing Rate as well as the Commercial Rate and was run in production March 20, 1956. This report will be run and distributed each month.

The exempt salary review was revised to include listing of proposed changes in level or rate, and the reports prepared and delivered to Monthly Payroll on March 16. Three additional reports were also prepared showing the distribution of exempt employees by department, by job level and by zone.

Three Classified Files conversion passes have been revised (one completely re-programmed) and debugged. The conversion operation exchanges the existing punched card equipment records for records suitable for the 702 data processing machine. The first attempt to convert actual data was made Saturday, March 31, 1956, and one of the three passes has been completed.

The monthly 702 Utilization and Billing Report was revised to provide more detailed information concerning the time and cost involved in certain types of operation and maintenance.

The first pass of a problem involving corrosion samples has been completed and the results have been returned to the customer.

During the month of March, the following non-routine assignments were completed for customers:

Employee & Public Relations	5
Engineering	31
Financial	10
Manufacturing	1
Radiological Sciences	7
	54

Service charges for the month amounted to $102,288.21. Services by customer were as follows:

Atomic Energy Commission	$ 861.50	01%
Employee & Public Relations	1 301.78	01
Engineering	31 537.66	31
Financial	52 967.55	52
Manufacturing	7 939.44	08
Operations Research & Synthesis	687.37	*
Radiological Sciences	6 992.91	07
	$102 288.21	100

*less than 1%

PROPERTY ACCOUNTING SECTION
MONTHLY REPORT - MARCH 1956

PROPERTY ACCOUNTABILITY UNIT

New functional coding system has been applied to the 300 and general reservation area; this completes conversion of all production facilities.

By authority of the Manager - Manufacturing, the 242-B evaporator facility has been transferred to Held For Future Use and the 200 North Area will be transferred to Not Used and Not Currently Useful during April.

Approximately 35% of the reserve applicable to community residences had been posted when new depreciation rates were received from AEC Washington. Reconciliation of reserve for new rates has been completed and changes are being recorded. AEC personnel provided 28 hours of assistance during the month and due to a termination will not be able to supply any assistance for an indefinite period. Cost of parking areas on the Uptown Shopping District, Parkway, C. C. Anderson, and Kadlec Hospital was supplied to AEC Property Section.

An additional person has been assigned to detail posting to reduce current backlog. During the month of February new property in the amount of $1,700,000 was transferred from unclassified to classified plant, however, 75% of the posting will be to installed facilities which require considerably less posting time than uninstalled equipment.

The status of property record mechanization at the close of March was as follows: Coding, transcription, proofing and reconciliation have been completed on Machine Tools, Firearms and Binoculars, Photographic, Railroad Rolling Stock, Motor Vehicles, Industrial Medical, Laundry Equipment, and Heavy Equipment accounts. Office Equipment account was completed; however, as a result of error in initial transcription and changes in coding and nomenclature, approximately 75% of the one and two cards in this account will have to be redone. Coding is completed on Portable Health Instruments and Miscellaneous accounts. Total of items taken over as of March 31, 1956 was approximately 10,000, or 45% of the items comprising uninstalled equipment. The target date set by Procedures and Computing to have the programming completed, debugged, and in operation is July 1, 1956.

CAPITALIZATION AND DEPRECIATION UNIT

The balance in Unclassified Property was reduced from $10,704,000 to $560,000 during March. This reduction resulted from the complete unitization of twelve construction projects and the transfer of these costs to Classified Property accounts. In addition to the complete unitization of these twelve projects, we have completed the unitization of seven additional projects with the exception of receiving final billings from the Cost Section and preparing the vouchers to transfer the costs to Classified Property accounts.

Reunitization of Project CA-512 was completed during March. This program entailed the redetermination of units of property contained in the 100-K Area, the redistribution of costs to these units of property, and the preparation of preliminary property record unit history cards which will preclude posting to detailed records. Current plans do not include the issuance of a revised formal unitization report. This matter has been reviewed with the Atomic Energy Commission, both locally and at the Washington level, and it was decided that no revised formal unitization report was necessary.

CAPITALIZATION AND DEPRECIATION UNIT (Continued)

March 6, 1956, a revision to the AEC Manual, Volume 1000, was issued containing standard service lives, depreciation rates, and depreciation principles. A number of changes have been effected in the basic depreciation procedures advocated by the Commission and a number of the points that were recommended in document HW-34278, "Hanford Depreciation and Obsolescence Recommendation", have been incorporated in this instruction. A meeting was held in A. M. Waggoner's office March 23, 1956 to discuss the implications and effective date of the new depreciation rates. It was decided that the new rates would be placed into effect on July 1, 1956. The accumulated depreciation reserve accounts will be adjusted at June 30, 1956. The excess depreciation resulting from the adjustment will be transferred to the AEC at fiscal year closing.

Activity was resumed in the area of RDX Equipment control during March. An inventory of RDX Equipment under the control of Engineering and Radiological Sciences is scheduled to begin April 9, 1956. This inventory will be conducted simultaneously with the inventory of Uninstalled Equipment charged to these two departments. The RDX control program is scheduled for completion during fiscal year 1956.

A comparison was presented during March pointing out the effects that are experienced in depreciation allocation when major processes either begin or discontinue operation. It was pointed out that the practice followed is based on the benefit-derived method of depreciation allocation. The analysis included a comparison of the allocation charges under the following situations: (1) immediately prior to starting production at 100-K, (2) with 100-K in operation, (3) with Purex in operation, and (4) with the T Plant deleted.

INVENTORY ACCOUNTING UNIT

A consolidated report of results of the physical inventories of electrical, maintenance and telephone materials on service trucks in the custody of Electrical Utility Section, Auxiliary Operations and Plant Protection Section and Telephone Sub-Section disclosed a combined overage of $69. The overage represented an average per truck of approximately $2 for the 33 physically inventoried. Total value of all materials counted was $9430.

The physical inventory of coal and fuel oil in the custody of Manufacturing Department, Auxiliary Operations and Plant Protection Section was conducted during March. Reconciliation of physical to book value is in progress, and a report of results will be issued upon completion.

Field work in connection with the physical inventory of 100 Areas uninstalled equipment under the responsibility of Reactor Section was completed during the month. Reconciliation of the physical count to property accountability records will begin in April.

The physical inventory of photographic equipment under the responsibility of Photography Unit, Employee and Public Relations Department, was commenced during the month.

Preliminary preparations for conducting the annual physical inventory of fuel and lubricants in the custody of Transportation Section have been completed. This inventory is scheduled to be taken April 23, 1956.

INVENTORY ACCOUNTING UNIT (Continued)

Procedures have been modified to permit a more realistic accounting for gasoline, cetane and diesel fuel inventories. Stock records now reflect actual quantities rather than gallonage as converted on the basis at 60° F temperature. Unit prices will be adjusted monthly to cover this variance factor. This method will allow better distribution of costs and, in addition, make any real shortage readily discernible to custodians. To assure proper vendor billing a separate detail of receipts will be maintained on the converted basis since the oil industry makes all billings at 60° regardless of actual temperatures on date of delivery.

PROPERTY MANAGEMENT UNIT

A review of the equipment budget with field forces was completed. As a result of our review, field units agreed to delete $272,000 from their proposed budget. These changes were reflected in the final submission of the budget to the Budgets and Measurements Section.

Sixty-one requests for the disposal of property were investigated and disposal instructions issued. Among the items were two tract houses, disposed of to clear the sites for industrial use.

A total of 39 requests for appropriation having a dollar value of $454,561 were investigated and processed during the month.

APPROPRIATIONS UNIT

The Appropriations Unit issued a report on a study directed to the existing financial planning and control practices and to the probable changes to such practices that will be brought about due to modification to Federal budgeting practices and by the proposed move toward a decentralized organization. In its present form, the study represents a summary of existing conditions and a forecast of practices which might be appropriate in the future. It does not represent a conclusive finding but rather forms the basis for further study of appropriate practices which may be applied ultimately.

Considerable interest in the subject of financial planning and control has been expressed by other departments. At the request of the Manufacturing Department, a talk was prepared and presented to a meeting of the 100 Area Projects and Personnel Development Sub-Section. The questions and discussion which ensued evidenced the need for a better understanding of the subject by the operating people.

A preliminary review of the Plant and Equipment Budget for fiscal year 1958 was performed by the Appropriations Unit and tentative recommendations were prepared regarding a format which would allow the association of various projects into programs and for such programs to reflect the facilities to be required in order to carry out a five-year objective. A more complete analysis will be made when budget data approved by department managers are available for final review.

During the month three project planning meetings were held with Manufacturing Department representatives. Projects reviewed for scope, justification, and cost included: Dummy Decontamination Facilities - 100 Areas, Sub-Critical Flux Monitor - 100 Areas, Inline Analytical - Sampling - Redox and Purex, Permanent Mold Casting Equipment - RMA Line, and Remote Machining Equipment - 234-5.

Project Number	Title	Amount of This Request	Total*	Date to AEC	Disposition
CG-661	Additional Heat Generation Facilities - 189-D Bldg.	$ 22,400	$ 22,400	3-7-56	Approved by AEC Review Board 3-15-56.
CA-662	2101-M Building Conversion	123,500	123,500	2-14-56	To be returned without action by AEC.
CG-663	Steam Driven Auxiliaries - Buildings 165-KE & 165-KW	555,000	555,000	3-2-56	HW-379, dated 3-21-56 Auth. GE $555,000.
CG-664	350° C Flow Loop	120,000	120,000	3-14-56	Approved by AEC Review Board 3-29-56.
CG-665	Metal Loading Facilities - 100-B,D,DR,F, & H Areas	150,000	150,000	3-19-56	Approved by AEC Review Board 3-29-56.
CA-668	Sprinkler System - Building 275-EA	26,000	26,000	3-16-56	Deferred by AEC Review Board 3-22-56.
CG-669	Water & Gas Leak Locating Equipment - All 100 Areas	112,000	112,000	3-23-56	Approved by AEC Review Board 3-29-56.
CG-671	Improved Calibration Facility 3745 Building	22,500	22,500	3-30-56	AEC Review Board Meeting 4-5-56.
IR-203	Coating Waste Transfer Line 241-S to 241-U Farms	17,800	17,800	2-29-56	Approved 3-16-56.
IR-204	Office Addition to 141-M Bldg.	15,000	15,000	3-16-56	Approved 3-23-56.
IR-205	Additional Street Lights, Richland, Washington	9,900	9,900	3-20-56	Approved 3-30-56.
IR-206	Installation of a 51-Pair Telephone Cable from the White Bluffs Exchange to the 100-H Area	14,000	14,000	3-22-56	Approved 3-30-56.

*Total previous authorizations plus this request.

APPROPRIATIONS UNIT

The following Plant and Equipment projects were processed through the Appropriations Unit during March. GE and AEC approval action was as indicated below.

Project Number	Title	Amount of This Request	Total*	Date to AEC	Disposition
CG-618 Rev. 1	Replacement of Steam Line Support Poles	$ 15,000	$ 110,000	3-23-56	Approved by AEC Board 3-29-56.
CG-620 Rev. 1	Melt Plant Modifications 314 Building	119,000	143,000	3-7-56	To be forwarded AEC-Washington for approval.
CG-622 Rev. 1	Replacement of Discharge Chute Liners - 100-B,D,&F Areas	-	-	3-9-56	HW-353, Mod. 1, dated 3-29-56, extended completion date.
CA-641 Rev. 1	Street Extensions - Hains, Gaillard, Harris	9,100	36,000	3-5-56	AEC-68, Mod. 1, dated 3-20-56, auth AEC $36,000. Work Auth. dated 3-29-56 auth. GE $5,700.
CG-647 Rev. 1	Back-Up Radioiodine Removal Facilities - Purex	1,090,000	1,150,000	2-7-56	Forwarded AEC-Washington for approval 2-27-56.
CG-648 Rev. 1	Auxiliary Radioiodine Removal & Nitric Acid Recovery Facilities, Redox	810,000	870,000	1-19-56	Forwarded AEC-Washington for approval 2-3-56.
CG-654 Rev. 1	Advance Design - Reactor Plant	500,000	600,000	3-26-56	Deferred by AEC Board 3-29-56.
CG-655	Crib Methods Selection Tests	100,000	100,000	1-25-56	Interim authorization approval by AEC Board 2-16-56.
CG-657	Improvements to Redox Plant Ventilation	205,000	205,000	1-19-56	Forwarded AEC-Washington for approval 2-3-56.
CA-658	Shielded Personnel Monitoring Station - 747 Building Addition	150,000	150,000	1-19-56	Forwarded AEC-Washington for approval 3-27-56.
CA-659	Decontamination Facilities in 100-H, 200-W, & 300 Areas	60,000	60,000	1-20-56	To be returned without action by AEC.

SS ACCOUNTABILITY SECTION
MONTHLY REPORT - MARCH, 1956

SUMMARY:

Our eleven year record of freedom from rail transportation accidents involving off-site shipments of SS materials terminated with the derailment of a Milwaukee train at 6:40 A.M. March 24, 1956 at St. Marys, Idaho. The accident was precipitated by a snow slide. Included in the derailed and damaged material was a carload of regular normal uranium solid scrap shipped from this site on a Government Bill of Lading to National Lead of Ohio. Services at the site of the wreck provided, by personnel of the G.E.-Metal Preparation Area-Manufacturing Department, resulted in the recovery of all but two test eggs and approximately 80 pounds of scrap. The material was reboxed at St. Marys, Idaho and reshipped within six days. Approximately 600 empty wooden slug containers were destroyed at the wreck site.

Metal Preparation Area Unit

In compliance with A.E.C. regulations we have been preparing an SS Accountability Manual for Normal Uranium. As of March 31, 1956, a rough draft was completed. The draft is now being reviewed with preparation for publication indicated prior to May 1, 1956. The Manual includes specific answers to the large number of questions contained in the A.E.C. Manual Check-List (Appendix 7404-092-A.)/

We have received seven small shipments of slightly enriched uranium slugs. An eighth shipment is in transit with more shipments to follow. Receipts are being verified by piece count and emission spectrometer assay. Application of the latter method represents significant advance in that the test is nominally non-destructive and has an adequate reliability of enrichment level for use as a verification procedure. As an added feature, the analytical costs are only one-fifteenth that of a standard mass analysis. Our measurements are considered adequate for Receiving purposes.

A potential expenditure of the order of $20,000-$30,000 was avoided by the release of a Neptunium bearing solution by Separations Technology to the Pile Physics Unit. The solution in question has been shipped to Argonne National Laboratories for purification and return. Due to the fact Argonne is currently incurring costs for purification of similar material they have agreed to process this material at no charge.

Reactor Area Unit

The Reactor Area-SS Accountability Unit has work in progress on several projects which should be completed in the near future. Each of these projects has as its prime purpose the improvement in the flow of source data and in the accuracy of inventory items. Four of these projects are of particular note:

1. Standardized physical inventory procedures are being developed and will then be compared with the existing procedures. Specific recommendations will then be formulated and presented to the custodian for adoption. Complete cooperation of the custodian is anticipated.

2. A revised form is being developed by the Reactor and Separations Accountability Units for control and use in transferring irradiated material to Separations. Among the improvements required are adequate space for calculation entries and for distribution coverage.

3. Refinements are being made to our procedure for calculating metal content of transfers between Reactor Operations and Engineering.

4. A plan is being devised having as its objective the earlier submission of bucket loading data. This will expedite the calculations of metal content as applied to specific buckets of slugs. The work is proceeding with full cooperation of the custodian.

Separations Area Unit

Operations of the various processes was subject to the influences of production scheduling. Associated with Purex start-up several non-routine transfers were made which, while of a complicating nature, are considered to be temporary. T Plant cleanout is now in progress. In contrast, UO_3 operation is at high levels.

Field activities directed towards compliance with Isolation and Metal Fabrication Review recommendations are progressing on schedule. No major difficulties in application have developed to date.

In conjunction with the custodian we have directed considerable time and effort relative to the formulation of a policy on adjustments to the Tank Farm-Depleted Uranium account. Renewed interest in the status of the account has been stimulated by termination of T Plant operations with the result that charges to the account have been finalized. The major difficulty is due to the fact there is no method available for direct physical inventory of the present tank contents. Close cooperation with the custodian and Manufacturing Cost will be required.

SS Accounting Unit

A letter dated February 28 was received from HOO-AEC announcing the continuation of Survey 13 with the verification of HAPO holdings of depleted uranium as of the end of March.

Physical inventory schedules for use in connection with Survey 13, Part II were prepared and accepted by HOO-AEC. A meeting was held on March 23 with HOO-AEC Accountability personnel at which four inventory witnessing teams were assigned to participate in physical inventories on March 28, 29, 30 and 31 and April 2 and 3.

Non-exempt employees of the Unit were again surveyed regarding participation in the Savings and Stock Bonus Plan.

SS Accounting Unit exempt employees enrolled in three courses offered during the second quarter of the Training Program.

Due to continued improvement in the date of submission of individual material balance reports by the Area SS Accountability Units, the February consolidated Material Balance Report was for the first time issued on the scheduled due date.

SS Measurements Unit

A large Shipper-Receiver discrepancy was observed on a group of 12 cans of nitrate product sent to Rocky Flats. Z-plant personnel have reviewed our measurements and handling procedures, and have found nothing to indicate that the discrepancy occurred at this site. We

SS Measurements Unit - continued

have been informed (1) that Rocky Flats has not recovered and measured all of the shipment residues, and (2) that Rocky Flats has been ordered to shut down their process in the event that any future group of cans shows a Shipper-Receiver discrepancy in excess of $25,000 worth of SS material, until the discrepancy is cleared up.

Several telegrams have been received from Paducah regarding difference in weights of individual UO_3 drums. The errors probably occurred at this site, and corrective action is being taken by Operations personnel. Apart from this, UO_3 shipment statements by Shipper and Receiver are in good agreement.

February plutonium balances in the Separations Section were generally in good control. Depleted uranium balances, however, were very underaccounted, particularly in Metal Recovery. Results reported by the laboratory are being audited as part of the investigation.

Approval limits for waste discards were calculated for all Z-plant processes except Recuplex dissolvers. A change of flowsheet has been made which renders the previous dissolver waste factors obsolete. Data is being accumulated for the factor revaluation. The only other Separations process for which limits have not been established is Purex. The Purex Sub-Section will specify them in June.

MUF control limits were submitted for the first time to the Separations Area-SS Accountability Unit as a basis for approval of the adjusting Journal Entry Vouchers.

The scale for bulk weighing of UO_3 at 224-UA has been installed. It has a capacity of 18,500 pounds and is supposed to be accurate to $\pm$ 2 pounds.

Graphs relating MUF to throughput are now complete on all Separations Section plants except Purex. This one will be completed shortly.

Applied reliability limits to February's Composition of Ending Inventory, Normal Uranium. This completes this report requirements for Metal Preparation normal uranium reliability limits.

For the purpose of firming up the reliability of the 204-1, -2, -3, -4 UNH storage tanks Redox is; (1) checking the volume calibration, (2) installing weight factor recording instruments which will be more accurate and with less variations due to weather conditions than the manomenter now in use.

FINANCIAL DEPARTMENT PERSONNEL AND ORGANIZATION

MARCH, 1956

	Current Month	Prior Month
Personnel Changes During Month		
Employees at beginning of month	505	502
Additions and transfers in	11	13
Removals and transfers out	(8)	(10)
Employees at end of month	508	505
Personnel by Unit at Month-End		
General	11	11
Auditing Section	16	16
Budgets and Measurements Section	15	15
Contract Cost Section		
General and Consolidations Cost Unit	11	11
Engineering Cost Unit		
General	4	3
Design Cost	9	9
Project Cost	22	22
Technical Cost	11	11
Employee and Public Relations Cost Unit		
General	2	2
Plant Activities Cost	10	10
Community Cost	5	5
Medical Cost	3	3
Manufacturing Cost		
General	2	2
Financial Representatives	13	13
Budgets and Control	20	18
Reports and Records	16	16
Analysis and Studies	3	3
	131	128
General Accounting Section		
Accounts Payable Unit	23	23
Accounts Receivable Unit	21	21
General Books Unit	17	16
Administrative Planning	3	3
Contract Reimbursements	5	6
	69	69

	Current Month	Prior Month
Personnel Accounting Section		
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	9	8
Weekly Payroll Records Unit	7	7
	66	65
Procedures and Computing Section		
Computing Operations Unit	24	25
Numerical Analysis Unit	11	10
Procedural Analysis Unit	15	15
Scheduling Unit	24	24
Records Unit	7	7
	81	81
Property Accounting Section		
Appropriations Unit	5	4
Inventory Accounting Unit	12	12
Property Accountability Unit	26	27
Property Management Unit	4	4
Capitalization and Depreciation Unit	21	22
	68	69
SS Accountability Section		
Reactor Area - SS Accountability Unit	5	5
Separations Area - SS Accountability Unit	20	20
Metal Preparation Area - SS Accountability Unit	8	8
SS Accounting Unit	7	7
SS Measurements Unit	8	8
	48	48
Rotational Trainees	3	3
	508	505

OPERATIONS RESEARCH AND SYNTHESIS SECTION

MARCH 1956

The following is the month end summary of personnel:

	As of 2-29-56			As of 3-31-56			Net Change		
	Ex	Non-Ex	Total	Ex	Non-Ex	Total	Ex	Non-Ex	Total
General	1	1	2	1	1	2	0	0	0
Operations Research Analysts	4	0	4	4	0	4	0	0	0
TOTAL	5	1	6	5	1	6	0	0	0
	*		*	*					

A letter reporting the conclusions reached in a preliminary study of the maintenance and equipment replacement program at Redox was issued.

Discussions of the inventory control problem have been held with the Manager, Purchasing and Stores, and arrangements have been made to consult with this section and appropriate service organizations concerning the proper utilization of inventory control formulae.

The study of appropriate personnel inventory and profile systems for the Hanford Atomic Products Operation is continuing. Contacts have been made with the relatively large number of Hanford components which routinely process information concerning personnel. Contacts are being made to obtain information exemplifying the most recent developments in codifying and processing such information.

The comprehensive analysis of alternative methods for integrated reactor data processing is continuing.

Work has been started on a comprehensive study of past slug rupture performance.

END

DATE FILMED

4 / 28 / 93